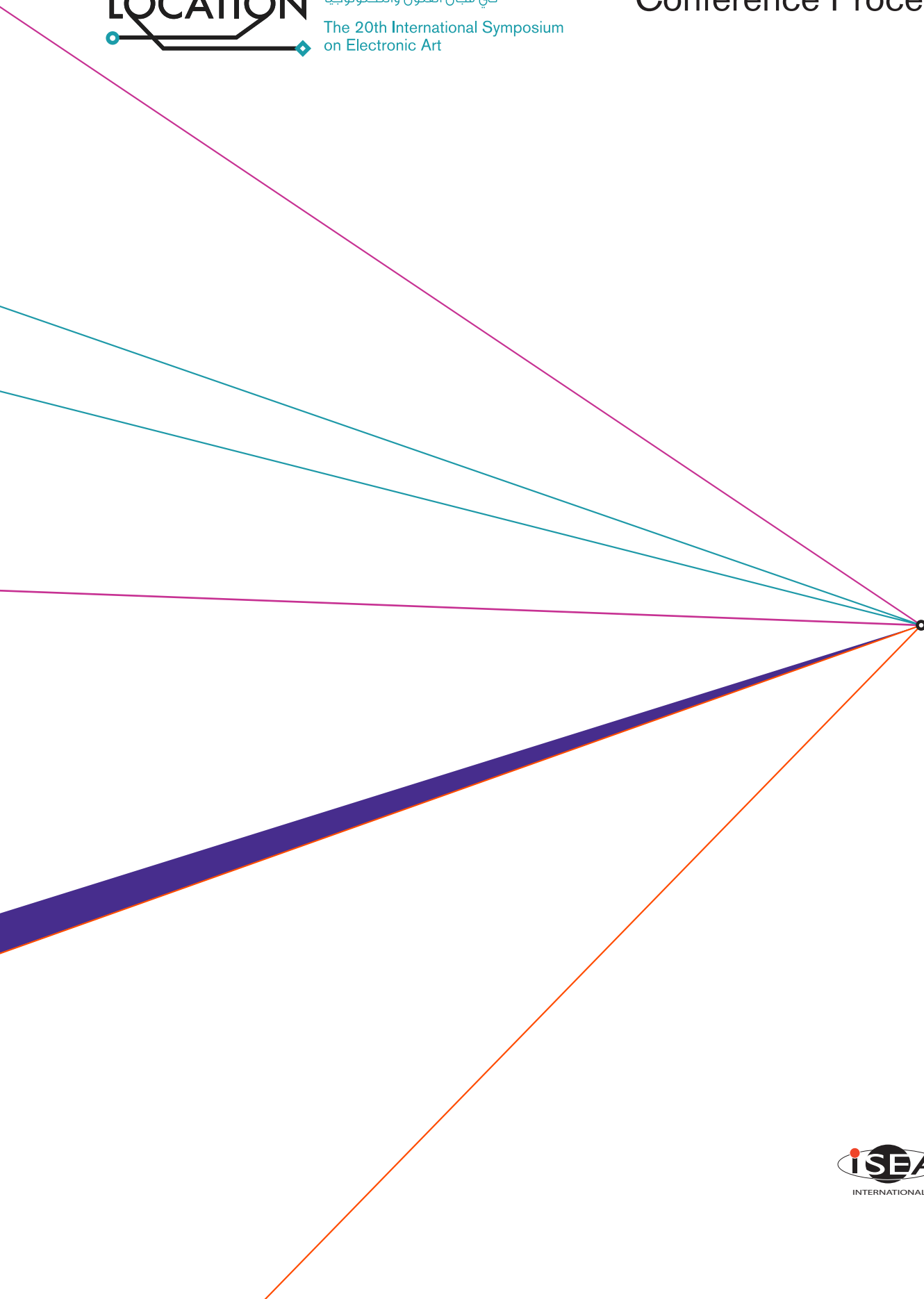




المؤتمر العالمي العشرون لدعم الابتكار
في مجال الفنون والتكنولوجيا
The 20th International Symposium
on Electronic Art

ISEA2014 Conference Proceedings



ISEA2014 Dubai: Location

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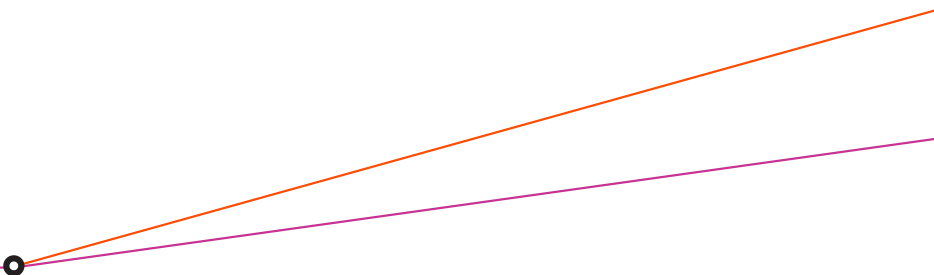
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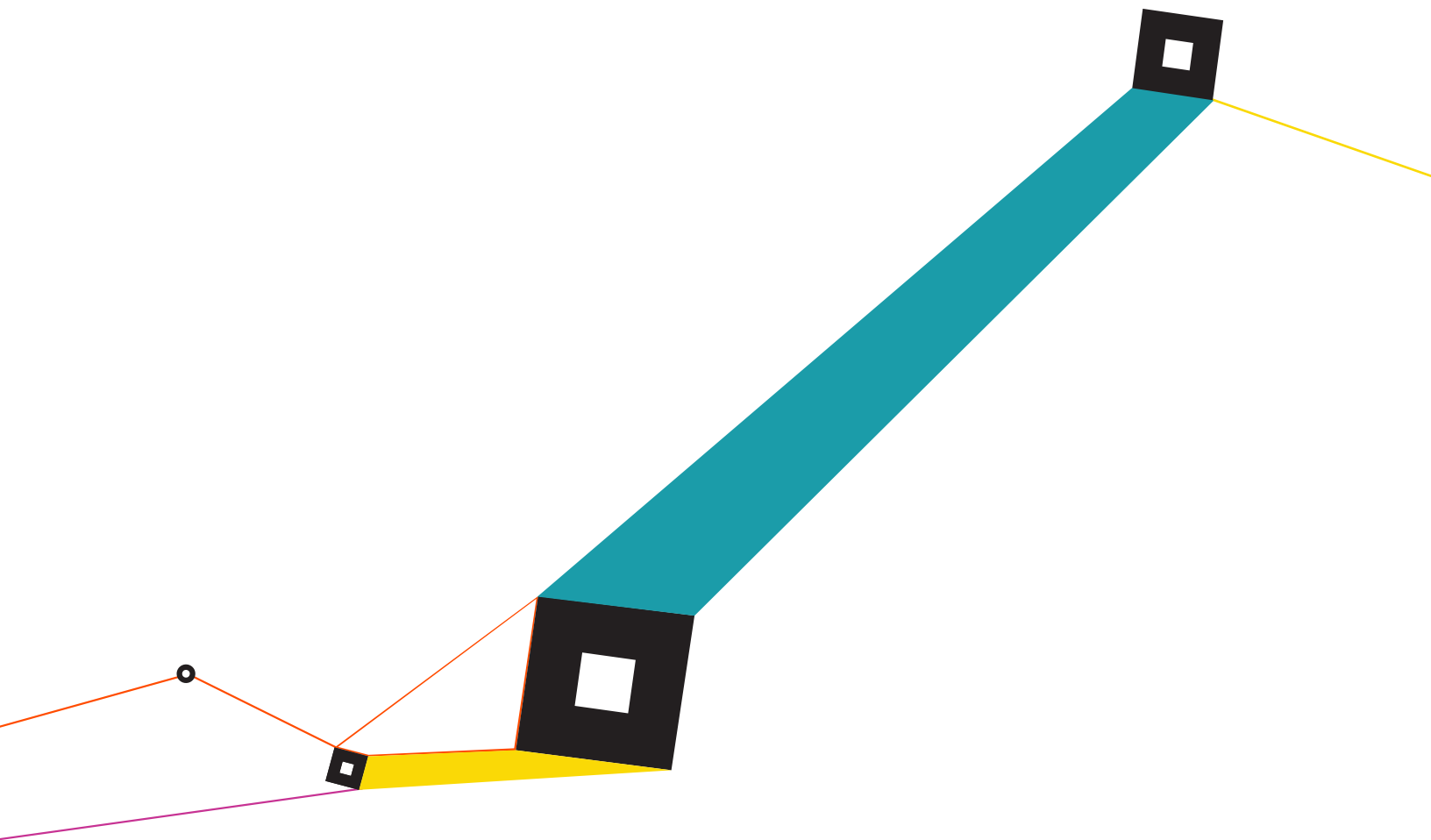
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ISEA2014

Where Art, Science and Technology Come Together

Edited by Dr. Thorsten Lomker





“A country’s greatest investment lies in building generations of educated and knowledgeable youth.”

Late Sheikh Zayed bin Sultan Al Nahyan



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The ISEA2014 Conference Team owes a great debt to all those who contributed to the preparation of this publication. First and foremost are the many speakers that we welcomed to the conference. Thus, I would like to express my explicit gratitude to those who submitted academic papers. Your contributions will be of great help to all those who did not have the chance to attend the conference in person.

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Finally, I would like to thank the Artistic Director of ISEA2014, Janet Bellotto. Not only did she carry the whole responsibility for the Symposium, but she also always had a kind smile for all of us who had the pleasure to support her.

Dr. Thorsten Lomker
ISEA2014 Conference Chair
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CONTENTS

12 ISEA2014 THEME: LOCATION

- 16 **BUILDING BRIDGES: ELECTRONIC ART AND NEW MEDIA TRAVELLING THROUGH THE EMIRATES**
Janet Bellotto

KEYNOTES

- 22 **OBSCURD BY THE CLOUD: MEDIA ARCHAEOLOGY, TOPOS STUDY, AND THE INTERNET**
Erkki Huhtamo

- 37 **LOCATION AND NAVIGATION: WAYFARING AND ARTS OF TUNING**
Sally-Jane Norman

CONFERENCE

STREAM 01 – TECHNOLOGY

- 44 **FLICKERING FORMALISM: THE ART OF LORNA MILLS**
RM Vaughan

- 46 **GETTING TO THE BOTTOM OF REALITY: DESIGNING CONTEXTS FOR THE EMERGENCE OF TRUTH(S) IN DOCUMENTARY VIDEOGAMES**
Aaron Oldenburg

- 50 **HOW AND WHY I CREATED THIS FUR BALL**
Laura De Decker

- 59 **LOCATING THE TERRITORY**
Beverley Hood, Chris Speed, Ben Butchart, Janet Dickinson, Julia Hibbert

- 67 **OBSERVATION INSTRUMENTS FOR IMAGINARY GEOGRAPHIES**
David Bouchard

- 71 **(+/-) PENDULUM: LOCATION IN THE INFORMATION AGE**
Raphael Arar, Ajay Kapur

- 76 **RHYCYCLING – FLUID BORDERLAND: PROCESSES OF KNOWLEDGE CREATION**
Flavia Caviezel

- 83 **SENSING ALL SAINTS' BAY AND PARAGUAÇU RIVER**
Karla Brunet

- 87 **THE DESIGN OF NATURE: CONSIDERING NOVEL ECOSYSTEMS**
Laura Beloff

- 92 **THE FUTURE OF THE DOMESTIC OBJECT 2025**
Slavica Ceperkovic

- 100 **THE MOON IS A MIRROR: ORGANIC AND NATURAL SCREENS**
Scott Hessels

- 106 **THE RISE OF HYBRID EXHIBITIONARY SPACES**
Francesca Baglietto

- 113 **THE USE OF MICROSCOPIC IMAGES TO DESIGN RANDOMIC TATTOOS**
Breno Bitarello, Daisyléa Paiva, Jane de Almeida, Beatriz Longo, Joao Queiroz

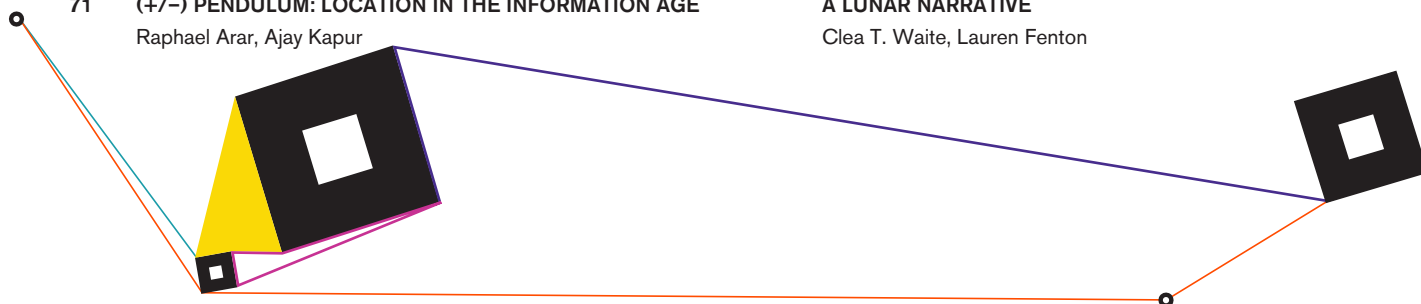
- 117 **TWEETING TWITTER: HOW TO MAKE INSTANT MESSAGES SLOW DOWN**
Byeongwon Ha

- 122 **VOICINGELDER: AN AVATAR PLATFORM FOR OLDER ADULTS INFORMED BY MULTIPLE THERAPEUTIC TRADITIONS**
Neal Swisher, Semi Ryu, Tracey Gendron

STREAM 01 – TECHNOLOGY (PANELS)

- 138 **META_NARRATIVES**
Cecelia Cmielewski

- 131 **SELENOLOGY AND THE CURIOUS TOPOLOGY OF A LUNAR NARRATIVE**
Clea T. Waite, Lauren Fenton



STREAM 02 – LOCATION/SPACE

- 138 **BECAUSE I AM NOT HERE, SELECTED SECOND LIFE
BASED ART: DUAL SUBJECTIVITY, LIMINALITY AND THE
INDIVIDUALLY SOCIAL**

Francisco Gerardo Toledo Ramirez

- 145 **DIGGING INTO THE CASSAVA TUBER: ARCHIVING
SOCIAL MEMORY IN CYBERSPACE AS SOCIAL DIGITAL
ARCHAEOLOGY**

Kok Yoong Lim, Sau Bin Yap, Joonsung Yoon

- 148 **GEOGRAPHIES WITHOUT BODIES, BODIES WITHOUT
LAND: VIDEO ART IN THE ISLAMIC WORLD**

Atteqa Ali

- 150 **HUMAN-COMPUTER IDEOLOGY**

Tomas Laurenzo

- 154 **LEARNING FROM THE MÉGAPHONE: DESIGN
PRINCIPLES FOR INTERACTIVE PUBLIC SPACE
DIGITAL INSTALLATIONS**

Claude Fortin, Alexandre Lupien, Kate Hennessy

- 161 **LOCATIVE ART, IDENTITY AND MEMORY: PRODUCTION
OF PARTICIPATIVE HYPERMEDIA DOCUMENTARIES
IN THE SETTLEMENTS OF LANDLESS RURAL WORKERS
MOVEMENT IN BRAZIL**

Andreia Machado Oliveira, Felix Rebolledo Palazuelos

- 167 **MAKING 'GLASS ROAD' MUQARNA WITH DIGITAL
ROAD PROCESS**

Mark Hursty

- 174 **NOWHERE, ANYWHERE, EVERYWHERE: LOCATION AS
FICTION AND FUNCTION**

Jonny Farrow

- 179 **SHANGHAI EXPRESS – INTERACTIVE TRAVEL THROUGH
COMPUTER GENERATED CITYSCAPES**

Christa Sommerer, Laurent Mignonneau

- 183 **SPACE JUXTAPOSITION IN ARTS**

Annie On Ni Wan

- 189 **THE JAZEERA AL HAMRA DIGITAL HERITAGE PROJECT: A
MODEL FOR DIGITALLY PRESERVING THE HERITAGE OF
THE ARABIAN PENINSULA**

Seth Thompson

STREAM 02 – LOCATION/SPACE (PANELS)

- 197 **GENRESIS – TRENDS AND TRAJECTORIES WITHIN THE
ART/SCIENCE GENRE**

Peter Anders

- 203 **RESPONSIVE ENVIRONMENTS: A PANEL ON THE
INTERRELATION BETWEEN LOCATION, ATMOSPHERE
AND DIGITAL MEDIA**

Christiane Heibach, Jan-Lewe Torpus, Andreas Simon

- 205 **THE AIR QUALITY EGG: THE INTERNET OF THINGS AND
COMMUNAL SOCIALITY**

Ilze Black, Graham White

- 211 **EXTREME ENVIRONMENTS: HONG KONG'S ART+SCIENCE
EXPEDITIONS**

Scott Hessels

- 214 **CREOLIZED OLFACTORY SPACES**

Gwenn-Aël Lynn

- 218 **CONSTELLATIONS AT THE INTERSECTION OF PUBLIC
AND PRIVATE SPACES**

James Partaik, Luc Lévesque

- 224 **AFFECTIVE-RESPONSIVE ENVIRONMENTS**

Jan Torpus, Andreas Simon

- 229 **ART IN THE AGE OF NETWORKS**

Cornelia Sollfrank, Sarah Cook, Felix Stalder

STREAM 03 – PERFORMANCE

- 234 **A DIFFERENT ENGINE**

Nigel Helyer

- 239 **A RELATIONSHIP BETWEEN THE INTERNET AND THE
PHYSICAL FOR THE ART**

Masanori Mizuno



244 **A STUDY OF ATTRACTIVENESS ON SOCIAL NETWORKS, MUSEUMS AND IMAGES**
Fernanda Maria Oliveira Araujo

252 **BASIC DESIGN FOR THE INTERACTIVE ARTWORK *IMAGE GARDEN* BASED ON THE TRADITIONAL KOREAN MYTH *LADY WONANG***
Je-ho Oh, Chung-kon Shi

260 **CONTEMPLATIVE INTERACTION IN MIXED REALITY ARTWORKS**
Matthew Riley, Adam Nash

265 **THE DEVICE IN INTERACTIVE ART: INTERACTIVITY, GESTURE AND SENSE**
Andrea Sosa

269 **THE RIGHT TO ARTIFICIAL LIFE: A DECLARATION OF RIGHTS FOR ARTIFICIAL LIFE**
Gregory P. Garvey

STREAM 03 – PERFORMANCE (PANELS)
276 **LOCATING THE ARTIST: A DIY-WANIA**
Alexia Mellor, Anthony Schrag

282 **THE LOCUS OF ACTION – TINTED WINDOWS**
Steven Devleminck, Boris Debackere

STREAM 04 – SENSORY BODY
288 **APPLYING DATA VISUALIZATION TO CULTURAL STUDY OF THE SALSA**
Matilda Asuzu

295 **ARCHAEOPHONY: (RE)CREATING ANCIENT SOUNDSCAPES**
Frank Ekeberg

300 **FACING INTERACTION**
Tomas Laurenzo

303 **MULTI-USER-BODY PERCEPTION IN BODY-MOVEMENT INTERACTIVE DIGITAL 3DIMENSIONAL AUDIO/VISUAL INSTALLATIONS**
Ken Byers

310 **SENSES AND PLACES MEDIATED BY WATER. CAN WE SENSE KINESTHESIS IN DANCE THROUGH RIPPLES IN A POND?**
Todd Cochrane, Isabel de Cavadas Valverde

314 **TELEMATIC INTERACTION IN CREATIVE COLLABORATIVE ENVIRONMENTS**
Mario Humberto Valencia Garcia, Elizabeth Granados Salgado

318 **THE NEW MEDIA AS TECHNOLOGIES OF SELF, OR 'THE SENTIMENTAL JOURNEY' OF MODERN NOMADS**
Polina Dronyaeva

324 **TRANSCODING ACTION: EMBODYING THE GAME**
Pedro Cardoso, Miguel Carvalhais

STREAM 04 – SENSORY BODY (PANELS)
330 **FROM A MEMORY OF A SMELL TO SMELLS OF MEMORIES**
Josely Carvalho

332 **SCENT OBJECTS: DESIGNING SPATIALITIES THROUGH SMELLS**
Luisa Paraguai

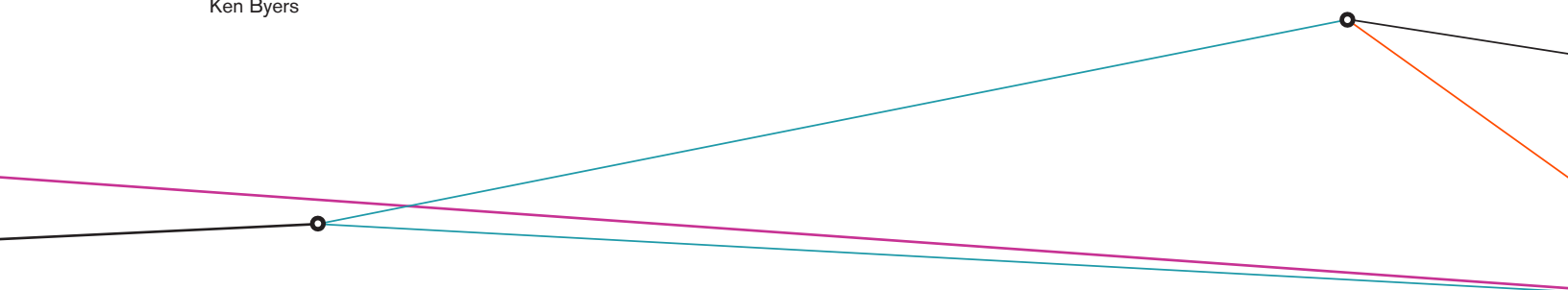
337 **THE POLITICS OF SMELL: HOW SCENT TECHNOLOGIES ARE AFFECTING THE WAY WE EXPERIENCE SPACE, SENSE OF PLACE AND ONE ANOTHER**
Nina Leo

STREAM 05 – EDUCATION/MEDIA
346 **2467/3970: A SHORTCUT TO CONNECTING PURDUE UNIVERSITY (USA) AND UNIVERSIDAD DE ANTIOQUIA (COLOMBIA) IN AN INTERDISCIPLINARY EXPERIENCE BETWEEN ART AND TECHNOLOGY**
Esteban García, Isabel Restrepo

352 **A THEORETICAL FOUNDATION FOR INTERLACING ARTISTIC AND ACADEMIC METHODOLOGIES**
Falk Heinrich

358 **AHEILOS VIRTUAL WORLD: CREATION AND EDUCATION IN THE SPACE OF INFORMATION**
Andreas Guskos

367 **BEAUTY AND CRITICISM IN PARTICIPATORY ART WORLDS**
Falk Heinrich



372 ISEA AND THE INTER-SOCIETY

Wim van der Plas

376 NEW DOMESTIC LOCATIONS: RECONFIGURING THE HOME THROUGH THE INTERNET OF THINGS

Chris Speed, Chris Barker

381 NEW MEDIA(TION) ART: ON THE NON-TRIVIALITY OF MEDIATION IN ELECTRONIC ART

Lau Ho Chi, Olli Tapio Leino

386 SPECIALIZED COMPETENCE OF ART AUDIENCES AND THE SIGNATURE OF TECHNOLOGY ARTISTS: A LOOK AT THE HISTORY OF ARTSCIENCE AND CRITERIA FOR EVALUATING IT

Raivo Kelomees

393 THE BREATH PROJECT

Hana Iverson, Jackie Brookner, Pramod Abichandi

STREAM 05 – EDUCATION/MEDIA (PANELS)

397 YOUR OWN REAL LIFE ENVIRONMENT AS A COMPUTER GAME

Simone van Groenestijn

STREAM 06 – PUBLIC SPACE

404 DO WE MARK TIME, OR DOES TIME MARK US?

Angela Davies

408 OVERLOAD/ABSENCE: THE COLLAPSE OF SPACE TO SURFACE IN REPRESENTATIONS OF URBAN SPACE

Annette Weintraub

414 GENERATIVE SPATIAL MONTAGE WITH MULTI-LAYERED SCREENS IN *LOST FRAGMENTS OF NIGHT*

Sojung Bahng, Patrick Hutchings, Doo Won Yoo, Chung Kon Shi, Graham Wakefield

419 MEDIA FAÇADES: AUGMENTING URBAN LOCATIONS THROUGH INTERACTION

Caitilin de Bérigny, Majdi Faleh, Freya Zinovieff

425 MOBILE SOUND AND (RE)MAKING PLACE

Jessica Thompson

STREAM 06 – ROUNDTABLE

430 IN DUBAI, IMAGINING FUTURE CITIES

Nina Colosi

STREAM 06 – PUBLIC SPACE (POSTER)

436 REMAPPING THE CITY WITH THE EPHEMERAL NIGHT SKY

Marea Atkinson

443 SENSING SCIENCE: THE MICROSCOPIC ENVIRONMENT

Cynthia Beth Rubin

445 SOUND: VOLATILE: METOPIA

Eva Sjuve

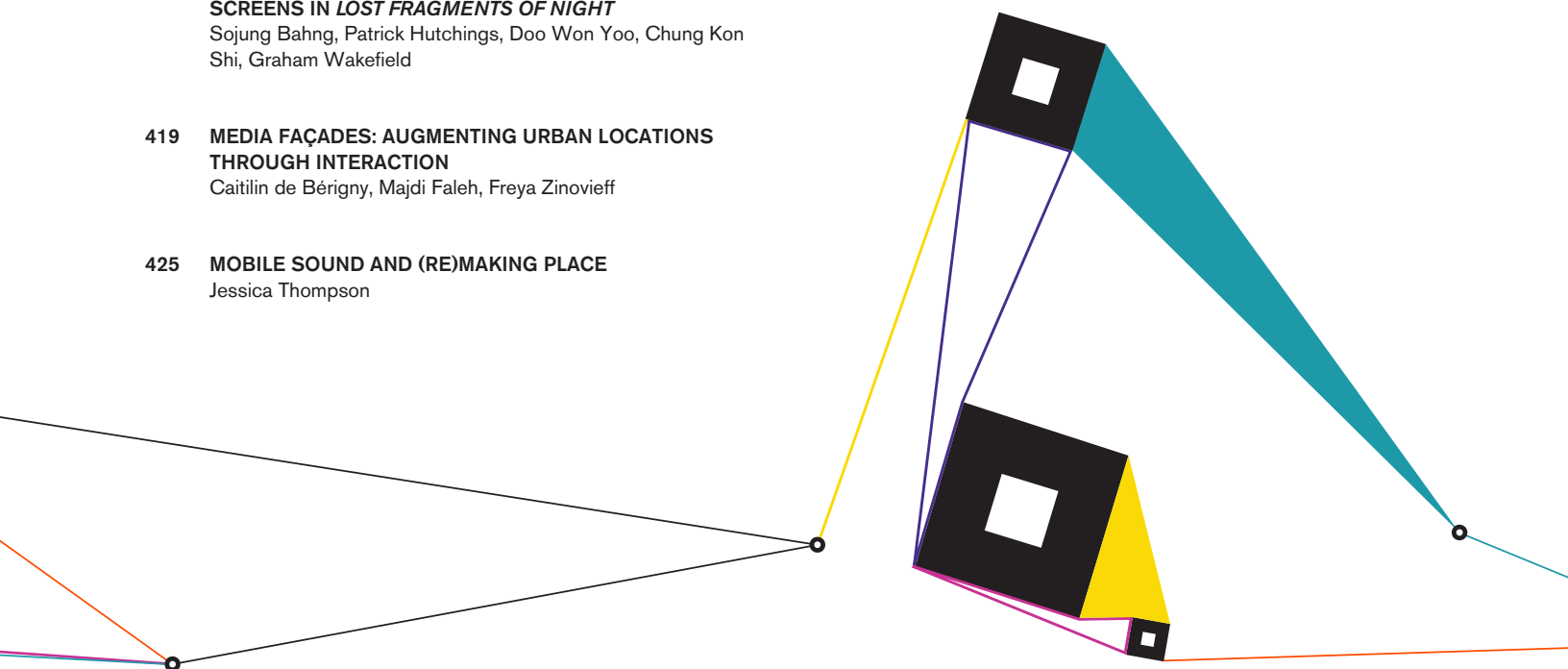
ISEA2014 EDUCATIONAL FORUM

448 THE ISEA2014 EDUCATIONAL FORUM

Nina Czegledy

452 INDEX OF AUTHORS

460 SUPPORTERS



ISEA2014 Theme

LOCATION

The United Arab Emirates (UAE) is a location with exquisite contradictions. Its location not only provides a place with world renowned architecture, but also boasts its development along the waters, its original trading ground. The 20th International Symposium on Electronic Art weaved local UAE traditions and history into the global context of new media science, art and technology. ISEA2014's over-arching theme of "Location" references the nature of where the UAE positions itself. It is a major transfer hub, a meeting place where dreams can happen, but greater yet, a place for innovation and change.

The symposium explored eight subthemes: Speculative Mediations; Technology, Science and Art: East Meets West; Emerging Economies/Emerging Identities; Nomadic Shifts; Digital Archaeology and Collaborative Spaces; Interlacing Worlds: Fiber and Sensory Mediation; Nomadic Highway/Bridging Media and Connecting Worlds/Linking Ideas. Themes were specifically chosen with both local importance and international relevance and the results continue to resonate both near and far. The subthemes framed the nomadic symposium that ranged in research questions, but were built with discussions on how we navigate place with breadth of community engagement and new technologies.

ISEA2014 was a unique and fruitful experience for presenters and attendees. Conference and keynote presentations, along with exhibitions, brought site-specific relevance, with a cross-over exchange of ideas, including student participation which made the location of Dubai unique. It was an opportunity to access a wide range of ideas that can contribute to future goals and development.

SUBTHEMES

Speculative Mediations

The media plays a primary role in our perceptions of the world around us. It can be argued that in some ways the media helps to create the world around us. What is our role as new media artists and manipulators? How do we engage in the world around us through the media? How do we move beyond speculations and get to the truth? Should we disclaim our personal bias within our work? If so, how?

Technology, Science and Art: East Meets West

From the very zero that makes possible the binary data that the information age is built upon to the recursive geometries of Arabesque patterns, the long history of mathematical, scientific and artistic contributions from the Arab world is well known. Within the context of the current state of geopolitical flux, speculation is solicited with regard to the contemporary and future balance of technological progress between East and West with prospects for trans-global cooperation and project collaboration.

Emerging Economies/Emerging Identities

Dubai has been the emerging economy to watch over the past 15 years. Both the unprecedented triumphs and dramatic overreaches have played a role in shaping identity and in many ways the reverse is also true. How has the course of emerging economies like Dubai's at the turn of the 21st century played into the identity of the developed world and in the world that has yet to emerge? In what way has this influenced the work of artists?

Nomadic Shifts

The rich history and cultural identity of the Emirati people is closely tied to nomadic lifestyle. Microclimate, geography and biology of the region are the generative cause of the nomadic life of the Bedouin. Today, the idea of the nomad has taken on a multitude of diverse connotations with new generative causes. How do these new notions of nomadic existence affect the practice of new media art?

Digital Archaeology and Collaborative Spaces

Digital tools and applications are being used to recreate lost communities and to better understand spatial and cultural histories. In architecture and planning, virtual worlds create the opportunity to push the boundaries of materials and concepts (chaos, uncertainty, responsive environments) – that may or may not be realized. How does this practice impact the evolution of social systems? How has this practice influenced education and collaborations across disciplines?

Interlacing Worlds: Fiber and Sensory Mediation

Trading states along the Silk Road, by their nature as wealthy cross-cultural meeting points, played a catalytic role in advancing the evolution of luxury or exotic goods. In nomadic societies, fabrics – whether for clothing or housing – were developed from products in their surrounding environments. Today, technology

has advanced to allow fibers and fabrics to engage upon our senses through optics and feedback response. The rich history of and the future possibilities for the influence of textile and related materials by digital technology are explored.

Nomadic Highway/Bridging Media

Social networks have played a pivotal role in today's communication system. The Internet and other digital media are indispensable in the effort to illuminate and advance the public discourse on complex social themes and political systems. This theme provided a forum for the exploration of the future of social media in art and its potential influence on the evolution of social ecologies.

Connecting Worlds/Linking Ideas

As professors try to provide a better learning platform for students, to diversify their subject matter and engage interdisciplinary platforms, this theme focuses on the connection between art and science in the classroom. With the world ever more connected, how can educators embrace new technologies to create new and stimulating ways to link ideas and cultures around the world. Can art that has been developed by new intersections with science and technology lead to a new visual culture that link people and their ideas instantaneously, crossing all borders?

ISEA2014 CONFERENCE STREAMS

When refining the conference program, six thematic streams were developed – of Technology, Location/Space, Performance, Sensory Body, Education/Media and Public Space – providing a variety of sessions for delegates' presentations outlining current trends, exploring established paradigms or introducing new areas of interest.

Stream 1 – Technology

Technology, a major tenet of ISEA, is both a tool as well as an area of research for artists, scientists, technologists and other professionals. Artists and designers often deploy technology as a medium to realize an idea. This stream presented debates on virtual space, augmented reality and social network platforms. Technology also can be used to create platforms that foster interactivity as well as inter and trans disciplinary projects. What are the technological frameworks used by artists to create an object and then manipulate it? With virtuality already established, what new emergent realities are being developed? How are aspects of gaming, new application and locational technologies being appropriated for art projects? Can contemporary technology interact with patterns, techniques and the aesthetics of traditional arts and crafts? If technology is culturally neutral, can it be a site where differing cultural sensibilities meet, as in the proverbial 'East meets West?'

Stream 2 – Location/Space

Location, the main theme of ISEA2014, is a major determinate of meaning. With increasingly multicultural communities how do spaces reflect creolization both in their configuration as well as through senses culturally evoked within those spaces? How can projects both respond to the specifics of location yet also refer to other spaces or places, particularly in this era of increasing globalization? Can cultures, places and spaces from the past be relocated and experienced in contemporary time? What ways can the geography of location be mapped and manipulated to create new ways of locating experience? How do cultural attachments to location shift over time, repositioning and redefining through new locational strategies? Do virtual spaces, spaces within networks and clouds, allow for dual subjectivities, augmented selves and aspects of bi-locationality? How can public and private spaces be activated by technologies to promote interactivity and active responses.

Stream 3 – Performance

The beauty of performance and electronic music is its temporality, taking place at a specific time and place, involving live performers and an audience. Addressing the ISEA2014 theme of location, most artists created projects to be performed and played within an Emirati setting. Through these electronic augmentations generated by performatively interacting with elements of location, new resonances were created that will continue to reverberate and resonate, from the UAE back to artistic communities throughout the world. Papers explored relationships between

musical and visual patterns, the poetics of performance, performative interactive artwork as well as presence within mixed reality works. Technology was advocated for activating the performativity of historic texts.

Stream 4 – Sensory Body

Sound, sight, smell and touch, as well as the interactivity of these senses, implicate bodies with experiential affects. How can projects be designed that evoke the senses through incorporating interactivity within and between human bodies? Can sensorial projects encourage and augment interaction between communities that historically remained distinct or even alien from each other? Today, technology has advanced to allow fibers and fabrics to engage our senses through optics and feedback responses. This stream included the rich history of and the future possibilities for applying digital technology to textiles and related materials. Through methods of archeophony can the sounds of historic spaces be reconstructed? Technologically recording human movement in dance, can we better understand cultural aspects of the bodies in motion? What is the relationship between smell and cultural memory? How can technology stimulate bodily interactions with installations?

Stream 5 – Education/Media

As educators aim to create better learning platforms for students, by diversifying their subject matter while also engaging interdisciplinary themes, this stream focused on the connection between arts and media technologies in the classroom. With the world ever more connected, how can educators embrace new technologies to create new and stimulating ways to link ideas and cultures from around the world? Papers also explored ways that audiences can interact with artists as well as how 3D technologies can bring the presence of objects and architecture into the classroom.

Stream 6 – Public Space

This stream focused on the role and influence of creative disciplines and technology on public interactions and the possibilities for enhancing urban spaces. Creative works in public space can help to generate visual identity and a sense of belonging. New media facades can augment public space, yet an overload of visual imagery on billboards can reduce public space to an ever-changing flat surface. Originating from a pearling and trading industry, the UAE has always been exposed and open to foreign cultures including the architecture and design of public spaces taken from multiple resident populations. In recent years, the country has been witness to rapid urbanization and has attracted a global multi-cultural society, factors that all impact the development of urban spaces. In this evolving reality, the role of culture in public space and of multicultural society on notions of public and private space are essential aspects of sustainable and culturally sensitive city development.



BUILDING BRIDGES: ELECTRONIC ART AND NEW MEDIA TRAVELLING THROUGH THE EMIRATES

Janet Bellotto, Zayed University, Dubai, UAE

ISEA2014, the 20th International Symposium on Electronic Art, was memorable. The plethora of workshops, lectures, exhibitions, performances and other events realized during ISEA2014 generated a wide range of discussions, observations and results that for some were life changing. The main intention was for ISEA2014 to build bridges – for new ideas and encounters to dispel cultural myths and exaggerations while facilitating learning and also inspiring future interactions. While capturing highlights of the symposium, it is also important to include emerging artistic practices, both locally as well as in the larger scope of the Arab world.

How do we define location? And how can we respond to that? This was core to the ISEA2014's over-arching theme of 'Location,' that references the nature of where the UAE positions itself. 'Location' bridges nationalities, mega-projects, architectural expectations, impact of development and more. 'Location' in the 21st century moves from the physical to the virtual, where today virtual realities help to enforce physical places. Meanwhile traditional craft has incorporated and even integrated technological innovation.

ISEA was established in 1988 and since then has manifested its symposia in over 20 cities around the world. The symposium consists of a peer-reviewed conference, a series of exhibitions as well as various partner events. Typically, the artistic platforms range from large-scale interactive artwork in public space to cutting-edge electronic sound and performance.

Seven subthemes framed this nomadic symposium. These developed from discussions on how we navigate the world with a breadth of community engagement while using new technologies. It was an opportunity to access a wide range of ideas that ideally can contribute to future goals and development. Two years in the making, it was a difficult undertaking for a place where locations for alternative practices are few. However, ISEA2014 was presented at time where soon will transpire 'Art in Metros' and when discussions of 'Art in Public Space' are beginning to surface. It subsequently became exciting to stage ISEA2014 in a location that continually builds for a better tomorrow, a place that has infused its mission to lead with innovation.

At the outset it is important to document and make reference to the artists and designers from the Arab world who were and already are at the forefront of Electronic Art or New Media. We also consider how the largest ever artist-run event about new media to take place in the UAE has opened potential platforms for the future. The expanded field of New Media art focuses on artwork created with new technologies – video, computer graphics, interactive sensors, digital tools, computer animation, robotics, virtual and internet forms – as well as those that cross-disciplines with science, such as biotechnology. There is an array of formats

to which these artworks are realized, including installation, performance and computer based platforms.

In the Arab world, New Media is slowly expanding into exhibition spaces and festivals have been connecting artists globally for some years. Shady El Noshokaty's annual Media Art Workshop, Medrar for Contemporary Art's Video Festival in Cairo, Wael Shawky's MASS Alexandria and Ashkal Alwan's Video Works – a grant and screening platform – are a few examples of pioneering events in New Media. In the UAE, galleries have recently showcased artists using new media, including Adel Abidin, Ahmed Matar, Ebtisam Abdulaziz, Larissa Sansour, Mohammed Kazem and Wafaa Bilal. These artists' work is now recognized internationally.

Ahmed Basyony's *30 Days of Running in the Space*, exhibited in the Egyptian Pavilion at the 54th International Art Exhibition of the Venice Biennale, was a critical work that inspired discussions at ISEA2014 on how the Internet and other digital media are indispensable in the effort to illuminate and advance the public discourse on complex social themes and political systems. The installation took the footage of the original performance and juxtaposed his demonstration of running alongside his footage of the Egyptian revolution prior to his being murdered.



Fig. 1. Ahmed Basyony, *30 days Running in the Space*, 2011, © Ahmed Basyony Family.

Within the set of institutional presentations at ISEA2014 was the ASCII Foundation for Contemporary Art Education, founded by artist and educator Shady El Noshokaty. It is a research center for Contemporary Art and New Media based in Cairo. The primary goal of the foundation is dedicated to supporting the education of young artists in Egypt, supplementing the art curriculum offered at state universities by emphasizing rigorous research and

archiving as the foundation for the practice of conceptual art. El Noshokaty's own work crosses between video and performance, where the multimedia installation *Stammer* started out as a teaching demonstration at the American University in Cairo. The installation represents the research of time, place and situations while creating a map of the human persona.

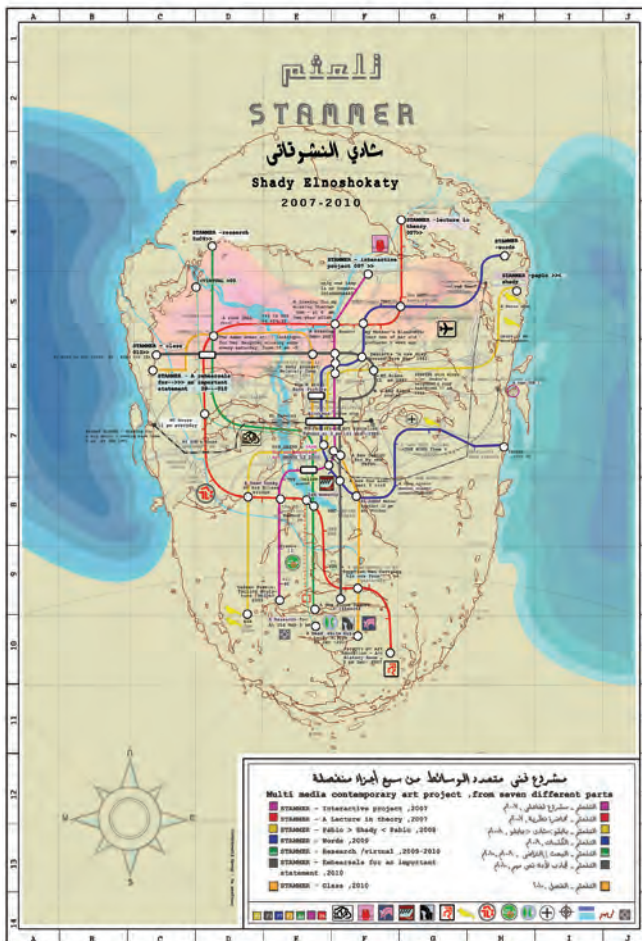


Fig. 2. Shady El Noshokaty, *Stammer*, poster for installation, © Shady El Noshokaty.

Although not officially partaking in the symposium, Ebtisam Abdulaziz and Mohammed Kazem, from the second generation of Emirati conceptual artists, have developed key work that integrate new media. For years Mohammed Kazem has been collecting data which he has displayed in two different formats. On one hand the data results in visual works, but the other is a set of GPS coordinates that he collected between 1999 and 2013. This data was realized in his installation *RAW DATA*, an exhibition curated by Sara Raza at the Maraya Art Centre in Sharjah. The installation of projected and animated GPS readings created an immersive environment of navigating through physical points of marked space and time. "Kazem turned to this electronic device, not only to calculate precise coordinates but to give new dimensions to his artworks by providing strict time and geographical anchoring." [1]

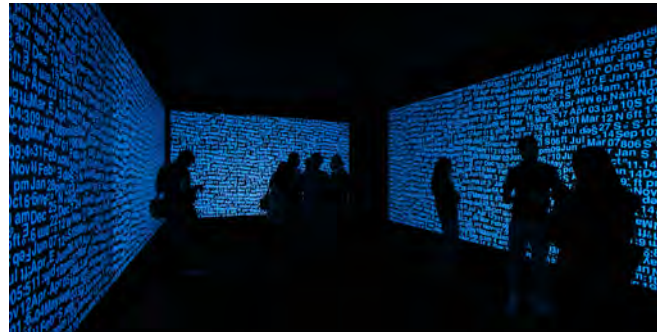


Fig. 3. From the exhibition *Raw Data 1999-2013*, Mohammed Kazem, 2013, video installation, size variable, © Mohammed Kazem, courtesy of Maraya Art Centre.

Ebtisam Abdulaziz is a multidisciplinary artist based in Sharjah. Her work reflects the education in science and mathematics she gained for her Bachelor's degree. She has used image-making processes and performance incorporating mathematics and systems that explore issues of culture and identity. In *Autobiography Part II*, the artist adorned a black suit accentuated with green numbers, similar to video displays at the stock exchanges. "These numbers reference how not only Emiratis, but also how people around the world assess their position within society based on financial status." [2]



Fig. 4. Ebtisam Abdulaziz, *Autobiography*, part 2 (production still) 2003-2007, video, © Ebtisam Abdulaziz, courtesy of Third Line Gallery.

The proliferation of geo-location information is now embedded within so many of our devices and daily operations, from social network updates to tags in the products that we consume. Iraqi-American artist Wafaa Bilal embodied this in his project *3rdi* where he physically attached a photographic apparatus into the back of his head to record what passes by him, as if capturing his past. He identifies himself as a storyteller, where these images are retold on the internet. [3] At the Maraya Art Park in Sharjah Bilal manifests location and the capturing of the environment in his *The Hierarchy of Being*. This mobile, semi-permanent interactive sculptural space is a walk-in camera obscura. "The *Hierarchy of Being* combines the thinking of two Iraqi scientists and thinkers from the Golden Era of Islam, the 10/11th century inventor of the camera obscura

Ibn Al-Haytham and 12th century Al-Jazari, who developed engineering practices for mechanical devices.” [4] Accompanying this work during ISEA2014 were other interactive installations presented in the surrounding exhibition containers – encompassing poetically themes of science, nature and geography.



Fig. 5. Wafaa Bilal, *Hierarchy of Being*, 2013, Portable interactive sculpture, size variable, © Wafaa Bilal, courtesy Maraya Art Centre.

Exhibition director Atteqa Ali juxtaposed a range of works from the Middle East, North African and South Asian (MENASA) region in *Locating the Local and the Global: Contemporary Art and Technology*. This exhibition included work by three artists who are very active in Egypt’s new media community. Ahmed El Shaer uses gaming as a framework to look at current social issues, both in print and videos. He develops short animated videos by combining Machinima, stock footage, 3D animation and experimental sound. Chadi Salama’s humorous *Dress Up* interacted with participants in a “head in the hole” installation projecting over 90 wacky clothing options. The third artist, Khaled Hafez, attained a degree as a medical specialist, eventually pursued an art practice, graduated from the Transart Institute with a focus on new media. A multidisciplinary artist, he has had a strong influence on an emerging generation of digital media artists. In 2014 Hafez animated his paintings in a video-animation project *Mirror Sonata in Four Kinetic Movements*. Ancient Egyptian symbols or hieroglyphs, are juxtaposed to present images of war, ultimately portraying a melody of cultural associations through a multichannel video.



Fig. 6. Khaled Hafez, *Mirror Sonata in Four Kinetic Movements*, 2014, multi-channel video-animation, © Khaled Hafez.

Emerging Emirati artists explored ideas of location through places and people. NYU Abu Dhabi featured the work of Khadija Fikri with the photographic series 42, which juxtaposes new and old photos of Dubai. Maitha Demithan uses an A4 scanner to create multi-viewed portraits of friends and family. Through a multitude of layers she reconstructs a moment, tracing the narrative surrounding the subject and the performative nature of the process. Hind Bin Demaithan’s *Hafth Al’a-Almswadih Da’iman* (always keep the negative clean) is a video object designed by the artist to share a collection of repurposed family negatives. Ammar Al Attar’s *Sibee/ Water* documents water taps found in and around a variety of areas such as factories, palaces and mosques.

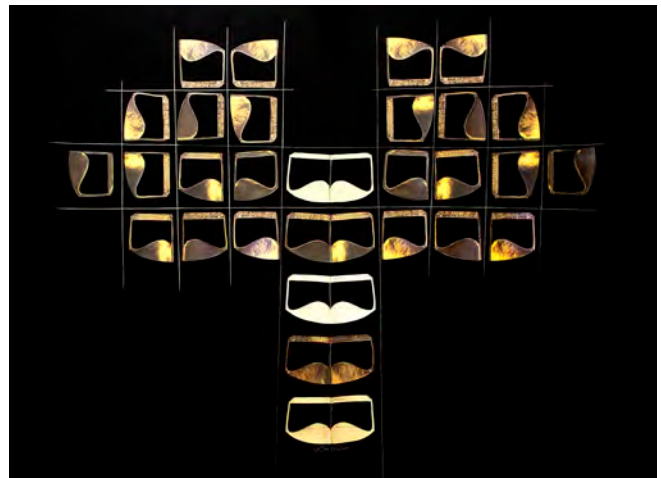


Fig. 7. Maitha Demithan, *Ummi*, 2014, 120 X 152 cm, digital transfer on fabric, © Maitha Demithan



Fig. 8. Hind Bin Demaithan’s *Hafth Al’a-Almswadih Da’iman* (always keep the negative clean), © Hind Bin Demaithan.

As a location, Dubai and the UAE embody layers upon layers of complex narratives, from their early history through their recent development as dynamic multiethnic economic and cultural hubs. These multiple narratives offer artists and academics an unprecedented opportunity to investigate, articulate and

manipulate phenomena of globally interconnected cosmopolitan worlds. In this unique meeting place, the potential for exchange is exponential and future collaboration for positive change in the world, through creative and innovative means, is eminent. The academic conference, held between 3-5 November, 2014, with an additional Education Day focus on 6 November, was filled with paper presentations, panels and roundtable discussions.

A Keynote Speaker highlighted each day, with every artist or scholar selected because their profession being intrinsically connected to one or more themes of the symposium. Each speaker provided motivational ground for emerging artists and designers, while also reflecting on what they had so far experienced in the Emirates. ISEA was originally founded in Holland, so it was fitting for the 20th edition to connect back to the symposium's roots. Dutch kinetic sculptor and innovator Theo Jansen discussed his evolving practice and demonstrated one of his "Strandbeests," which through their creation and activation advocate for sustainability and the future. Out of a suitcase he pulled a small PVC tube and from that one element he continued to ask questions about how the material could be transformed, to ultimately become a large kinetic sculpture that moves with the wind.

Media archaeologist Erkki Huhtamo navigated us through the digital highway of images, captured on the Internet, providing a possible tool for understanding the cloud. In his presentation he traveled through a history of images, places and meanings, bringing the conversation into the eminent place of 'cloud computing.' By seducing us through a vast amount of contemporary images, simulating the image saturation of contemporary life, Huhtamo pointed to life in the cloud.

Artist Janet Echelman's work bonded strongly to the history of the fishermen's environment, as her public art practice was inspired by a interacting with a fishing community while pursuing an artist residency in India. Her gigantic net-like sculptures, which incorporate craft and new technologies, now transform urban landscapes. In a shift of location, cultural theorist Sally-Jane Norman presented at New York University's new Abu Dhabi campus. Her presentation connected the various discussions that arose earlier during the academic conference. She navigated through various cultural associations, having delegates consider how, with today's tools, we can better negotiate identity with the world around us.

ISEA2014 preceded the multitude of art in public space projects that are surfacing in the United Arab Emirates. The nation currently counts down to the world stage of Expo 2020, with the theme of *Connecting Minds, Creating the Future* that embodies a "universal concern to all of humanity." [5] Expo 2020's location is ephemeral, but along with ISEA2014, memorable at 24.4667° N, 54.3667° E. Expo 2020's first official workshop with students in the UAE provided to generate exciting ideas was organized in conjunction with ISEA2014. It is important to note that the symposium – and all its programming – was enriched by the four major universities

in the UAE that teach art and design: American University in Dubai, American University of Sharjah, New York University Abu Dhabi and Zayed University. ISEA2014 was the first time all four universities collaborated on a single event, being the seed for growing continuing institutional collaborations in the future. The community built during ISEA2014 has generated its own vibrations that will continue to resonate. ISEA itself remains a nomadic international platform for academic discourse in art, science and technology collaborations, along with promoting and displaying work in public settings. In Dubai, through intense collaboration across multiple education and art institutions, ISEA2014 was Educating with innovate projects, highlighting Emerging practices and exploring Experimental processes that successfully engaged in an Exchange of ideas that continue to inspire.

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OBSCURED BY THE CLOUD: MEDIA ARCHAEOLOGY, TOPOS STUDY, AND THE INTERNET

Erkki Huhtamo, UCLA, USA

"The Façade of tradition may mask innovation"

Peter Burke, *Varieties of Cultural History* (1997)

THE PATH TO TOPOS ARCHAEOLOGY – A PERSONAL VIEW

There has been much discussion in recent years about media archaeology, and a growing number of scholars are situating their works under its banner. However, there is no such thing as "media archaeology" as a unified set of tools, methods and protocols. There is no scholarly network either, no journals, conferences or departments. Rather, there are media archaeologists who agree about some principles while diverging on others. Whatever coherence it may have, media archaeology is a discursive field where ideas are presented and (con)tested, and applied to ever-new topics and areas. There is nothing wrong with this as long as the multidirectional nature of the discourse retains its ability to uncover new questions and areas of investigation, while working against new orthodoxies, doctrines and boundaries. As it is, media archaeology is a "happy science," or perhaps no science at all. Perhaps it is best described as a critical practice that questions assumed certainties and performs excavations at the backlands of media culture, challenging canonized media cultural narratives, pointing out omissions, continuities and discontinuities.

The variant I have been developing during the past twenty years I call "media archaeology as topos study" or simply "topos archaeology." Its origins go back to my student days, when I was trying to decide whether to follow the path of a cultural historian, literary scholar or visual media art activist. In the end, the outcome was a combination of all these. I learned about Ernst Robert Curtius, the founder of topos research, at a university course on literary theory. The idea of *topoi*, or recurring commonplace elements that "lived on" in literary traditions for hundreds and even thousands of years, stimulated my imagination. It must have happened because I was inspired by both historical and contemporary cultural forms. As a film buff I had already noticed how the cinema was recycling formulas, reinterpreting and revising them to retain the audiences' attention. Here was something similar. Clichés the spectators already knew (whether they knew it or not) were given ever-new surface manifestations. What seemed novelty and progress was built on processes that were often very old and iterative in nature. Film culture, it began to dawn on me, was a kind of topos engine.

I first encountered the "life of topoi" first-hand as a beginning scholar in the early 1980s, when I got an opportunity to spend a few months in Rome, collecting material for my master's thesis at the Vatican Library. I thought then I would spend my life as a cultural historian focusing on sixteenth-century French and Italian culture. I was particularly fascinated by the thinking of Michel de Montaigne, whose overarching interests, lack of prejudice, refusal of judgment,

and self-ironic and skeptical stance deeply influenced my outlook on life. I decided to focus my thesis on the journal he kept during his trip to Italy in 1580-81.¹ I was particularly curious about how he found out what he found out. Did he read guidebooks, learn from local inhabitants, rely on received notions (traditions) or draw his own conclusions from what he saw? I became interested in the channels of communication that were operational in a cultural setting that was very different from today's media culture. Yes, Montaigne did read books, listened to locals, and kept his eyes open. But did he rely on the testimonies of his own senses? The answer was yes and no – a conclusion Montaigne would probably have endorsed.



Fig. 1. Michel de Montaigne, *Journal de Voyage en Italie*, ed. Pierre Michel (Paris: Librairie Générale Française, 1974). Author's copy, bought in 1980.

As I read accounts by other sixteenth-century travelers I began noticing regularities between texts that could not have influenced each other. Why was Florence always characterized as *la bella* (beautiful) while Venice was always *la ricca* (rich) and *Padova la dotta* (learned)? These could not possibly be the travelers' own judgments, although they often emphasized how they had seen this or that thing "with my own eyes." The solution appeared

on the title page of yet another manuscript, where the traveler had scribbled a list of the epithets of Italian cities: “Milano la grande, Vinegia [Venice] la ricca, Genova la superba, Bologna la grassa, Firenze la bella, Padova la dotta, Ravenna l’antica, Roma la santa.” I understood that whether the travelers had learned the epithets from other travelers, local guides, guidebooks or other sources, they were relying on a topos tradition: using inherited formulas that were called up when needed.² Among other functions, the list served as a mnemonic aid to memorize the names of the principal Italian cities. In that sense it was part of living oral culture.

When a traveler characterized Florence as “beautiful” it had less to do with a first-hand impression than with the ways in which tradition, “the hand of the past,” guides perceptions. The travelers may have used the topoi deliberately, but more often than not they probably resorted to them without being fully aware of them. The topos tradition was much more extensive than the minds of the individuals who lived and worked within its influence. The stereotypical formulas they evoked in their writings connected them to cultural traits that went back to the Middle Ages and guidebooks like the famous *Mirabilia urbis Romae*, used by countless pilgrims across centuries. What made the observation striking for me was the context: the sixteenth century was supposed to be the aftermath of the Renaissance, a period of profound rupture when humans opened their eyes to their surroundings after the long metaphysical sleep of the Middle Ages, as the great liberalist art and cultural historian Jacob Burckhardt taught us in the nineteenth century. Finding out how people’s perceptions were guided by tradition rather than their own judgment demonstrated for me that Burckhardt’s great idea of the Renaissance was really a projection of the values of his own time back into the past.

As it happens, the focus of my interests began to shift, although I never lost my passion for the past – the lost dimension preserved as fragments waiting to be interpreted. Visual culture took center stage as I began to organize media art festivals and art exhibitions. However, it did not take long until I rediscovered the topoi in another context. In a way, the idea of topos itself became a topos for me, as I gave it a new meaning in a field where it had scarcely been applied before. This happened in the context of the virtual reality mania that exploded around 1990. Like many others, I became intrigued by the new synthetic realms or “cyberspaces” one was able to ‘enter’ by means of wearable head-mounted displays and datagloves (even “datasuits” were experimented with). Did they really represent an ontological rupture in our relationship to reality, a before and after experience? I was less convinced about this than the self-made VR prophets like John Perry Barlow who began almost overnight spreading the new technological evangelium. “Immersing” myself in the archive, I discovered earlier phenomena like the panorama and the stereoscope that had already offered immersive experiences in the past. Both had given rise to “manias” in the nineteenth century. So how new was “the new”?

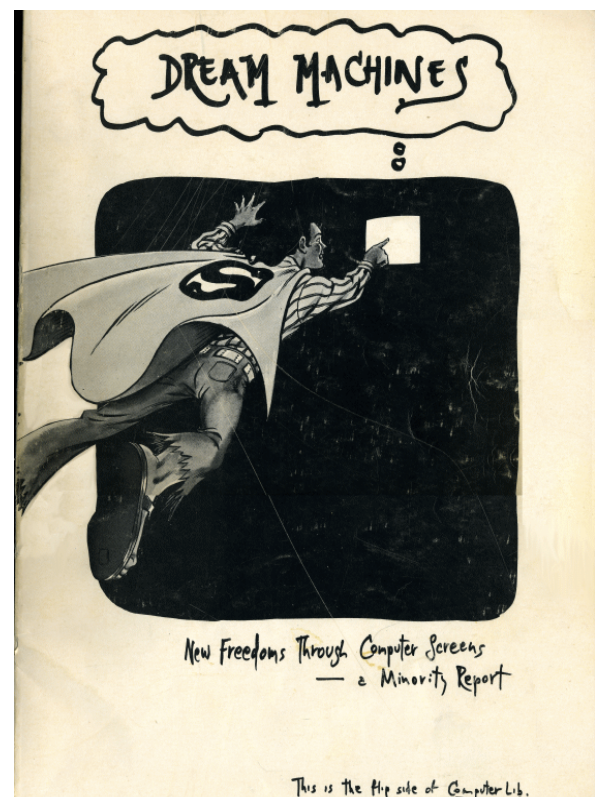


Fig. 2. Cover of Ted Nelson, *Computer Lib / Dream Machines* (Self-published, 1974).

I began to understand that behind all the promises of progress and innovation the media industry was concocting to attract potential customers, it resorted – either deliberately or because it operated within a “giant’s footprint” – to topoi that could be thousands of years old. The most obvious example is the topos of “breaking through the screen” that is routinely evoked whenever a new screen-based device is introduced. Instead of being a divide between incommensurate realms, the screen is presented as a fluid gateway supporting effortless two-way traffic. Human figures either jump from it to the space of the spectator or the spectator dives into its confines, as countless advertisements testify. The same topos has also been used in more critical contexts, from David Cronenberg’s cult film *Moviedrome* to the cover of Ted Nelson’s *Computer Lib / Dream Machines* (1974), a classic book on the future of computing. In the latter, a smiling rag-tag nerd wearing Superman’s cape is flying toward a computer screen, pointing at it with his finger, while a slogan states: “New Freedoms Through Computer Screens.” The emphases may differ, but these cases spring from the same age-old topos where the borderline between reality and its representation melts away, already encountered in ancient China and Greece.

TOPOS AND MEDIA CULTURE

Topoi serve at least three main roles within media culture: as connectors to older and broader cultural traditions, as discursive commentaries on media cultural forms, themes, and fantasies, and as motifs exploited by the culture industry.³ They are

potentially used by anyone from advertisers and industry propagandists to political strategists, artists, writers, journalists, and “normal people.” Topoi can become a part of modern folklore as the case of the “little people” demonstrates.⁴ Lilliputian characters living inside media machines have been evoked in many contexts from photography, gramophone, radio and television to personal computers.⁵ These miniaturized creatures may well have their origins in fairy tales and fantastic stories about the enormous and the minuscule. Some cultural agents even seem to have believed in their existence, although more commonly they have been concocted for other purposes. The “little people” are neither human nor non-human. They function as mediators of the miraculous side of new technology – aspects that are beyond common sense and therefore potentially magical, frightening or uncanny. Wondering at them or laughing at their antics helps soothe the anxieties permeating the technological society.



Fig. 3. “How did they all get in there?” Advertisement for Victor Talking Machine Co., Camden, N.J., USA. C. 1920. Public domain.

Ernst Robert Curtius was mainly interested in literary topoi – such as the “world upside down” or the *theatrum mundi* – that originated in classical antiquity and traveled across the Middle Ages to the modern age, serving as cultural connectors and transmitters. They were kinds of empty vessels that could be filled with new content, over and over again. They therefore became building blocks for cultural traditions. However, it could be added that while many topoi that still keep appearing are very old, others may have been created more recently. It should also be pointed out that topoi are not limited to textual traditions. Visual imagery can also be treated as topoi. There are links with the iconological / iconographic method in art history which can be traced back to the work of Aby Warburg (for whom Curtius dedicated his magnum opus *European Literature and*

the *Latin Middle Ages*, 1948) in the late nineteenth and the early twentieth centuries.⁶ The recent revival of interest in Warburg and particularly in his unfinished *Mnemosyne Atlas project*, an ambitious mapping of visual motifs across centuries and visual forms, has run parallel with the emergence of media archaeology.⁷



Fig. 4. “Imagine the Olympic Games most prominent personality.” Advertisement for Samsung D600E Olympic Winter Games Edition, published in *Scanorama* (Scandinavian Airlines), February 2006, p. 85.

What I call “topos transmissions” can be detected in all forms of media culture as I have tried to demonstrate in earlier studies. Although I have normally applied my approach to media forms of the past, it could be argued that topos archaeology is also suited for making sense of current networked media culture. Because of space limitations, it would be impossible to describe here the many ways in which textual, aural and visual motifs are transmitted across the internet, or to dissect the extremely large and heterogeneous (anti)bodies of online users (including individuals, groups, officials and corporate agents). Especially since the emergence of Web 2.0 and the social media, grasping the “traffic” of data flows without neglecting their individual “bits” has become an urgent task. For scholars (like myself) who have been trained in dealing with cultural traces that are stationary, the rapidity and instability of online communications may seem overwhelming. The challenges are made even more demanding by the political, commercial, cultural and ethnic interests that have questioned what once seemed a realization of Marshall McLuhan’s famous prophecy of the “global village.” The internet as it is today is fractured, partly visible, partly invisible, in constant transformation, and prone to manipulation by countless agents with very different motivations.

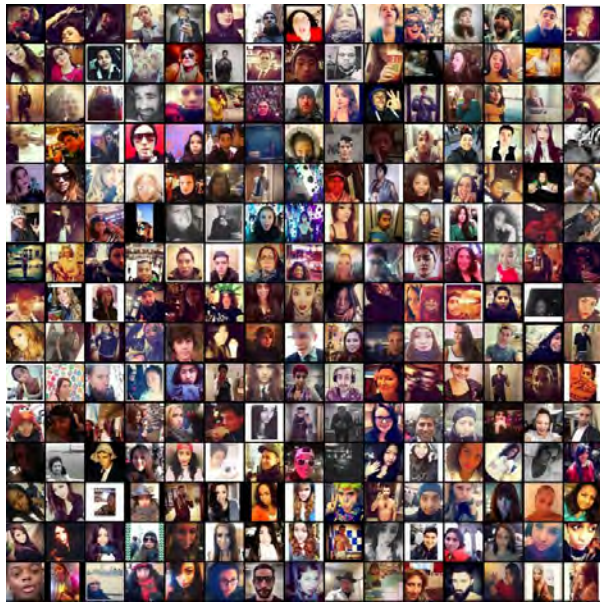


Fig. 5. Selfiecity - posegrid of selfies from New York City. Press image from selfiecity.net.

Lev Manovich, known for his ambitious but ultimately semiotically impossible effort to define the “language of new media,” has turned to the mining and visualization of big data to make sense of the proliferation of imagery at online platforms of Web 2.0.. Recent projects such as *Phototrails* (2013) *Selfiecity* (2014) and the ongoing *Do Happy People Take Happy Images? Measuring Happiness of Cities* (2014-) use combinations of automated data analysis and human labor to detect patterns in digital imagery on sites like Instagram and Twitter.⁹ Taking this task is laudable, but the results have been disappointing, limited to simplistic and formalistic conclusions about the surface manifestations of things. Data visualization easily leads to the aesthetization of research; the graphs and digital “mass ornaments,” abstracted from huge masses of data, become goals in themselves. Arguably there would be more important goals: understanding the “paths” along which visual motifs travel, merge and mutate, and – most crucially – grasping their semantic dimensions. It may be interesting to compare the formal properties of “selfies” taken in different cities around the world, but it is more urgent – and difficult – to find out what deeper meanings the products and practices under scrutiny carry beyond obvious generalities. This work has already been started by a younger generation of communication researchers who are “digital natives”.¹⁰

THE CHALLENGE OF “INTERNET MEMES”

Topos archaeology cannot offer any macro-scale “bird’s eye views” of data traffic. Whatever generalizations it may suggest, result from particularities attained by inductive reasoning. Following motifs as they spread on the network and cross over from one area to the next involves “manual work,” but offers potential for revealing disregarded aspects of online cultural practices. Topos archaeology may help to answer questions such

as: Does the internet truly represent a rupture, or support continuities with cultural forms that preceded its formation? Has it turned into an all-embracing zone that has subsumed “everything there is” into itself? Is it possible to make sense of reality by inhabiting the internet “bubble”? Conclusive answers would require more extensive explorations than are possible here. I will only demonstrate how topos archaeological analyses of internet traffic might be conducted by discussing briefly two interconnected examples. The first has to do with internet memes and the second with the discursive imaginary around “cloud computing.” I hope to show that although media archaeology is often associated with the past, it can also shed light on recent, even contemporary, developments.

“Meme” has become a catchword on the internet, although it originated elsewhere. It was famously coined by the evolutionary biologist Richard Dawkins in *The Selfish Gene* (1976) as the counterpart to “gene” for the purpose of accounting for “mimetic” cultural evolution as opposed to genetic evolution. Dawkins suggested that “selfish” replication of memes – units of culturally transmitted content situated in the brain – might provide a model for the spreading of human culture. Although the meme was not the main issue in Dawkins’s book, its implications were developed further by scholars like Susan Blackmore, the author of *The Meme Machine* (1999), and those working on the new field of Memetics it inspired.¹¹ There are certain similarities between Dawkins’s meme and Curtius’ topos, because both refer to cultural forms that encapsulate ideas and motifs and are passed on through cultural transmission. However, meme is really a spin-off of evolutionary biology and embedded within debates and controversies about its theories. Topos comes from the studies of culture, art, literature and rhetorics, and is therefore free of the complexities of the gene/meme argument (although it does have its own).¹²

In popular internet usage “meme” has gained a solid standing. However, it has been stripped down of its scientific connotations and context, leaving just a skeletal cliché, a formula that retains the barest features of Dawkins’s theory. The meme has come to signify certain types of semiotic messages that are rapidly and extensively disseminated across the internet. Although the original scientific denotation has been watered down, it is useful to retain “meme” as part of the expression “internet meme.” Limor Shifman has suggested that internet memes differ from Dawkins’s original definition in an important respect: instead of “depicting the meme as a single cultural unit that has propagated as well,” she treats memes as “groups of content units.”¹³ For Shifman this reflects the changed conditions of activities on the internet. In the past “individuals were exposed to one meme version at a given time” whereas in the internet one can easily see “hundreds of versions of any meme imaginable.”¹⁴ This is an interesting observation and also concerns the changed conditions of historical topos traditions or chains on the internet. For topos archaeology there is another fundamental question: are internet memes a new manifestation of historical topoi or something entirely different?¹⁵



Fig. 6. Image macro (not yet image macro meme), based on a photograph from a *Life* photo shoot (1963) with journalist Hugo Gernsback wearing one of his would-be inventions. From www.poptechjam.com/image-macro-and-memes-same-same-but-different/.

Although the phenomenon has been rapidly gaining complexity, and several meme “genres” have been singled out (by Shifman and others), one of the most recognizable internet meme categories is no doubt the “image macro meme.” Its basic characteristics were aptly and self-critically explained by a contributor to the online magazine *Pop | Tech | Jam*, who had posted online a black & white photographic image depicting an older gentleman wearing radio-like “goggles,” with the caption “The rarely seen Google Glass prototype” inserted into the image. The writer explained:¹⁶

“This, my fellow jammers, is an example of an image Macro, but it is not, I learned recently, an Internet Meme. Well, not yet anyway. While my bit of goofy photo fun meets the image Macro criteria (it is a captioned image that consists of a picture and a witty message or a catchphrase), it has yet to sweep through the internet like a relentless plague on humanity like this: [embedded YouTube video of PSY’s Gangnam Style].”¹⁷

Limor Shifman has suggested that internet memes are “groups of digital items” that have three common features: they “share common characteristics of content, form and/or stance, are created with awareness of each other, and are circulated, imitated, and transformed via the internet by multiple users.”¹⁸ It is generally assumed that image macros are created by ordinary internet users by means of Photoshop and related tools, but their task is made even easier by meme generator websites like icanhas.cheezburger.com and memegenerator.net. They offer huge numbers of memes, systems for voting on them, and seed images for creating and uploading new ones. Those that prove

successful (a tiny fraction), spread through the internet, tempting users to create variants. Because popular ones reach large numbers of viewers, they may be assumed to represent “common opinions.” The process is endless, and may lead to long chains, which again branch into unexpected directions. Beside using found images, it is possible to introduce one’s own, but making them catch on is very difficult. Most image macro memes are anonymous and follow coded rules, the most obvious being the use of the Impact font for the captions.¹⁹



Fig. 7. “OH HI i come from internet,” LOLcat meme variant, from www.icanhas.cheezburger.com.

The most famous early image macro meme category is the LOLcat (“laugh out loud cat”), which has, in less than a decade, branched out into countless variants, prompted efforts in “history writing,” and gained the attention of print media from *Time* to *Wired*. There is even a paysite called “Lol Cats Research,” an effort to cash in on its popularity. A typical LOLcat image macro consists of a photograph of cute cat in a funny situation provided with a misspelled caption. The latter corresponds with a speech balloon and is supposed to mimic the cat’s speech (if cats knew English). LOLcat image macros resonate with the huge popularity of cat images and videos on the internet. They sometimes make self-reflective comments – in one variant a cat peeks out from inside a hollowed out tower PC, stating: “OH HI i come from internet.”²⁰ Although the LOLcat phenomenon does seem native to the internet, humorous photographic and graphic images of cats dressed as humans, associated with props of all kinds, and provided with “words from the cat’s mouth,” form a tradition that goes back at least a century and longer, if we take earlier anthropomorphized cat images into account. This has been noted on the internet.²¹ The essential question is: did these earlier topos manifestations inspire the LOLcat? Do they belong to the same lineage, or did LOLcats appear “accidentally,” triggering the awareness of past cat topoi only *after* the phenomenon had gained visibility through mass circulation?



Fig. 8. Cat postcard by Harry Whittier Fries (1879-1953). Rotograph Company, NY, 1905 (No. B838). Public domain.

There is no fits-for-all answer. There are cases, though, where an image macro meme chain connects with a preceding topos tradition. “Pandora’s box” provides a perfect example. As Dora and Erwin Panofsky pointed out, the Greek myth of Pandora created an extensive tradition of variations and commentaries.²² Indeed, it became a topos that underwent significant changes in time and became interpreted according to changing cultural trends. The Panofskys point out that Pandora had originally no “box” at all – it became added to the myth as a misnomer by Erasmus of Rotterdam, who confused the Greek word *pithos* (jar) with *pyxis* (box). Stock character image macro memes inspired by Pandora’s Box connect with the topos, sometimes explicitly, as when a grinning young man (known as “Good Guy Greg”) states: “Found Pandora’s Box / Didn’t Open It,” or when a lolcat in a cardboard box says: “congradulashuns / you just opened pandora’s box.” However, the tradition moves on. When the “Torrenting Turtle” states, “Hears a song on Pandora / Begins epic music download,” the referent has shifted, pointing to the popular internet music streaming service. Instead of continuing far into the past, the chain has been shortened, modified and redirected, albeit not entirely cut.



Fig. 9. “congradulashuns you just opened pandora’s box.” LOLcat meme variant that connects with the Pandora’s box topos. From www.ichahaz.cheezburger.com.

It often seems that image macro memes circulate and proliferate within a realm that is essentially secluded from the “world outside,” although it keeps making references to it. As a student of mine said about lolcats, they “live in a world parallel to our own.”²³ The connections to the topos traditions of the past could therefore be assumed to take place occasionally and haphazardly rather than systematically. On the other hand, internet is rapidly subsuming the “archives” of the humankind into itself and making them available through digital tools like Google Books, The Internet Archive and Google Image Search. Where the topos traditions uncovered by Curtius formed chains appearing and disappearing along time-based vectors, when uploaded on the internet they are represented more like associative maps where the connections are spatial rather than temporal (in a way reminiscent of the panels of Warburg’s *Mnemosyne Atlas*). To the extent that the internet inspires users to activate them, that happens by making choices along non-temporal and non-linear paths. The topos traditions on the internet seem to be turning into “topos fields” where moving to any direction is the rule of the game.



Fig. 10. “Pepper Spraying Cop,” cut out from the original news footage, was pasted on other images by image macro meme creators. From www.flickr.com.



Fig. 11. The "Pepper Spraying Cop" spraying on the Constitution of the United States. Image macro meme spreading on the Internet.

While the internet may have become an "all-embracing" realm for the millions of users who repeatedly visit it via smartphones, tablets and laptops, it is important to keep tracing fractures and fault lines where it coincides and collides with the "real world." A well-known example is the "pepper spraying cop" meme, which was triggered by a widely publicized event during the Occupy Wall Street Movement in 2011.²⁴ The police officer Lt. John Pike used pepper spray at the University of California Davis campus against a group of protesting but peaceful students.²⁵ The meme began proliferating when a cropped cutout figure of the cop (with a white background) was posted on the internet, making it easy to embed it within other images. Very soon the cop began squirting his pepper in a wide variety of settings, many of them with clear historical referents. He sprayed God in the face in Michelangelo's Adam's creation (from the Sistine chapel, a popular seed image for internet memes), the Beatles in the cover of Abbey Road, and even the vampire in *Murnau's* silent film *Nosferatu* (1922). Appropriately, he also made interventions at Guantanamo Bay, and at the signing of the US Constitution.²⁶

Understood as group of related manifestations (following Shifman's suggestion), the pepper spraying cop meme raises questions about its nature and consistency, issues of planning vs. randomness, clear message vs spontaneity, seriousness vs. pranksterism. As the different manifestations of the meme normally remain anonymous (no maker is know) and the motivations largely unexplained, the scholar is left without possibilities of truly penetrating the code or codes supposedly controlling the dissemination and proliferation of the motif. The pepper spraying cop therefore inhabits a split and heterogenous cultural space where the intentions of its creators and its "readers" rarely meet in ways that would assure one of matching intentions. A remarkable amount of polysemy reigns, in this case increased by the lack of captions to "anchor" the meanings.²⁷ While certain manifestation carry a clear political message, others remain more ambiguous, related with equally ambiguous "lives" of associated pop cultural motifs on the internet. Finally, some aspects of the meme become associated with much longer topos traditions.

It is important to avoid over-emphasizing the naive and spontaneous nature of meme creation. Although many of them may have been quickly created as jokes or pranks, internet memes have become a coded form of expression that can be harnessed for many purposes and often require specific knowledge to be properly constructed or interpreted. Examples can be found from China, where memes have been successfully used to bypass the government's relentless efforts to suppress the freedom of expression.²⁸ It has been realized that blocking images, particularly ones with allegorical references and ambiguous connotations, is more difficult for the censors than doing so for words and numbers. Perfectly innocuous images gain radical meanings when interpreted by codes that have already been internalized by internet users. Thus pictures of "grass-mud horses," or cute alpacas, can be turned into subversive messages when combined with the *double entendres* of the Chinese language. In another example, the convey of tanks in the famous iconic photograph from the Tiananmen square protests was replaced by giant yellow rubber ducks. In another version, a cow is seen stopping a convoy of caterpillars, and in yet another, only the surface of the street remains. The erasure of the tanks and the single protester ("Tank Man") who stopped them sends a powerful message.²⁹



Fig. 12. Scarlett Johansson as a street musician. One manifestation of the "Scarlett Falls" image macro meme string spreading on the internet.

Like topoi, internet memes – as any form of user-generated internet content – can be exploited by professional promoters as viral advertising.³⁰ A good example appeared in early October 2013 when tabloid newspapers and internet gossip sites began spreading memes featuring the actress Scarlett Johansson. The source image was a "snapshot" ostensibly snapped by a paparazzo of Johansson accidentally falling on a street while filming in Glasgow. The figure of the falling Johansson soon inspired a huge burst of reactions from meme makers, or so it seemed. Additional elements like a laughing Donald Duck or an arrow sticking out from Johansson's thigh were inserted into the original photograph. In other cases the figure of the film star was cut out and embedded in other scenes. Scarlett was soon seen riding on a dolphin, hanging from the edge of the Grand Canyon, flying on a magic carpet, doing a DJ act, and dancing with the late Michael Jackson, and stealing food from a table. She was turned into a victim of police violence in the streets of Athens,

and of a black gang member's baseball bat, and so on. For those who got tired of the bombardment the most memorable variant may have been the original street view from which Scarlett had been simply made to disappear.

Interestingly, the incident had already taken place a year earlier and publicized then in British Tabloid newspapers with no meme reaction. It wasn't what it was claimed to be. In fact, Scarlett had been performing her own stunt fall for a scene shot with hidden cameras for Jonathan Glazer's film *Under the Skin*. The idea had been to capture the by-passers' spontaneous reactions to Scarlett's "accident," to be used in the film which opted for a candid camera-like look. The "amazing scene" had been shot unannounced "six or seven" times throughout the day to get different reactions from those who happened to be present, as the actress revealed when *Under the Skin* was presented at the Venice Film Festival in September 2013.³¹ The sudden meme explosion that took place soon afterward was hardly more spontaneous than the original incident had been. Although *Wired* still believed it was, when it wrote about "the bizarre story behind The Scarlett Johansson Falling Down Meme" in April 2014 (at the time of the film's theatrical release), it was most likely a deliberate promotional act, which became, inadvertently or deliberately, carried on by independent meme "artists" picking up the thread.³²

Internet memes certainly have characteristics of Curtius' topoi, although – because of their visual component and their frequent emphasis on emotions – they can also be associated with the "passion formulas" traced by Aby Warburg in visual culture across centuries (the notion influenced Curtius' topos). Both form "transforming traditions" of formulas and motifs. The main difference is the rapidity with which meme transmissions occur. Processes that used to take centuries have been as if speeded up. Because of their rapid-fire dissemination, it is not clear if the logic of the periodical appearances and disappearances that typify the "lives" of historical topoi still characterize internet memes. The internet tends to preserve everything put within its confines; search tools make it easy to call up anything within seconds, including otherwise hard to trace topoi of the past. Will once popular internet memes just disappear in its "vaults" or will there be "meme revivals" to come? Will there be perennial "classics" that keep generating variants forever? Internet data is characterized by the duality of presence and flux; everything stays, moves and mutates. It may not be misguided to characterize the internet as a topos transmitter-generator that both subsumes topos traditions into its "archives" and gives rise to new ones in an endless circular motion.

CLOUD COMPUTING AS A TOPOS TRANSMISSION

The other case study, cloud computing, has also inspired numerous image macro memes.³³ It is an interesting example of the discursive processes of signification taking place on the internet. Like meme, cloud computing is a common buzzword.

Its technical referent goes back to the computer time-sharing systems that originated in the 1960s. Later, with the development of the personal computer and the internet, the idea was implemented on a much more massive scale. Instead of having all the programs and data on one's desktop, users would retrieve and share them from remote servers. Steve Jobs presented this idea – without yet having access to the phrase "cloud computing" – in a famous comment on the future of computing in 1997.³⁴ It is uncertain who coined the notion "cloud computing," but it certainly gained currency after Amazon.com launched its "Elastic Compute Cloud" service in 2006.³⁵ Since then cloud computing has boomed, becoming a lucrative business offered both for corporate clients and private users.

One of the most intriguing things about cloud computing is the discrepancy between the fact and its representations. The true public image of the computing cloud would be an unmarked, nondescript warehouse in a remote hard to find location, filled with hundreds of computer servers. The situation recalls aspects of the era of mainframe computers in the 1940s and 1950s, when few people, except mathematicians and programmers, had direct contacts with computers. These were kept behind closed doors at governmental and military facilities. Everyone else's idea of them was indirect – explained in books, commented on by cartoons and television shows, and fantasized in Hollywood movies like the Desk Set (1957). The "Giant Brains" became mystified; the computer turned into a hidden object – partly material, partly discursive – for cultural fears and desires. Its "coming out" took place gradually through offices and businesses until it reached private users with the advent of personal computers in the 1970s. Of course, cloud computing cannot be directly compared with this development, because computing devices are now at everyone's fingertips, routinely used to access the "cloud." Still, cloud computing is surrounded by an aura of mystery and awe.



Fig. 13. "Look up there that's where computers come from," an image macro meme spreading on the internet.

It is not difficult to find comments where internet users express their ignorance and bafflement about cloud computing; its meaning and origins are mysteries to many. This is reflected in image macro memes. In one, a man (father?) and three children are lying on their backs on a lawn; one of the children points to the sky and states: “look up there / that’s where computers come from.” In another, the Philosoraptor is reflecting, “if data stays trapped in the cloud too long / will it fall as rain?,” while the “Technologically Impaired Duck” (an “Advice Animal” meme character) wonders, in obvious roleplay aligned with its character: “Backup to the Cloud? / But the sky is clear...” The majority of Americans has been claimed to think that “cloud computing is disrupted by bad weather.”³⁶ Predictably, such comical – posed or real? – ignorance has been picked up by advertisers. In a television commercial for Public Storage we see a middle-aged couple loading their belongings to the carriage of a balloon and releasing it to the sky because they have heard that storing things in the cloud is “the latest thing” and “the future is now.” When the balloon hits electrical wires and the load comes tumbling down, they decide to use a traditional public storage unit.



Fig. 14. “If data stays trapped in the cloud too long will it fall as rain?” Image macro meme featuring the Philosoraptor character. From Diylool.com.

One way of excavating the discursive formations around cloud computing is to begin with etymology. However, this makes the choice even more intriguing, because historical dictionaries emphasize the negative associations of cloud, especially when it is used as a verb. In Samuel Johnson’s *Dictionary of the English Language* (1827) “to cloud” refers to “to darken with clouds; to cover with clouds; to obscure,” and worse still: “To make of sullen and gloomy appearance.” A cloud is something that obscures, makes less evident, “sullies” and “defames.” *Pantologia. A New Encyclopedia* (1813) lists, among similar ones, a meaning which sounds a different tone, claiming that cloud is “any thing that spreads wide.” This would be an understandable reference point for cloud computing, but it is rarely if ever explicitly evoked in the discursive formations surrounding it. Along the trail of depressive associations we also find references that associate clouds to

mental aberrations. In a medical case study from 1828, a patient describes, how “a cloud had fallen upon his head, and he believes that this cloud still remains upon it, obscuring his mind, and altering his feelings towards his wife and family, and towards all objects whatever.”³⁷ Perhaps there is a link to the discourse on “psychedelic clouds” – cloud-like environments created in the mind by chemical substances – in the 1960s.

Reflecting such negativity, the blogger Scott Berkun collected a list of reasons why he thinks that “cloud computing is a bad metaphor.”³⁸

- Clouds are fleeting. They don’t last.
- Clouds are vague and open to wide interpretation. No one sees the same thing when they look up at clouds.
“Do you see Darth Vader’s nose?”
“No... oh do you mean the leg of the camel sitting under a tree?”
“What Camel?”
“Nevermind.”
- Clouds often bring rain, lightning and cold wind.
- You can’t see the sky, or the stars, when the clouds are out. (However, *Obscured by Clouds* is a good Pink Floyd album few know about.)
- When someone has ill-formed ideas, we say their thinking is cloudy.
- Clouds, and the weather, are unpredictable.

It could be added that the “mushroom cloud” is probably the darkest metaphor of the modern era, the ultimate emblem of mass destruction and potential self-annihilation of the humankind. Why has the expression cloud computing caught up in the technocultural imagination? One reason may simply be the contrast it creates with the actual state of things. Corporate data centers – the actual “clouds” – are secretive, visually uninviting and undecipherable by common sense. They represent the reverse of open access, so important for the internet ethos. The tightening grip of cloud computing on all data (including the author’s sensitive academic email) has happened simultaneously with series of revelations about massive interceptions of digital data by governments and hackers alike. At the same time accusations have been mounting against companies like Google for hiding revenues from tax officials and engaging in ruthless monopolistic practices behind its “don’t be evil” motto. The commercial and governmental “engines” that run the digital online world have been often associated with negative connotations.

It is wise to avoid concocting conspiracy theories, especially in the complex and multi-nodal realm of the internet, but it is impossible not to notice how perfectly the talk about cloud computing serves corporate interests, covering up unwelcome associations. Clouds are – in spite of the load of negative connotations – light and fluffy, and for many something poetic and even “sculptural.” They have been a rich source for the human imagination, inspiring countless poems, paintings, photographs

and other cultural products.³⁹ The current boom of cloud-inspired contemporary art must in its own way reflect the cloud computing trend, although relatively few works have made explicit links with it so far.⁴⁰ Clouds represent a collective experience available in endless variations for every member of the humankind. They defy gravity and the frustrating limitations imposed on humans by earth-bound life. Clouds are about weightlessness and free flight; the “stuff” of fantasy and daydreams. They also embody a semiotic paradox: although they belong to nature and are therefore independent of human control, clouds are semiotically subsumed into culture as signs. Simply looking at them performs such an operation. Stock images often express this paradox by associating clouds with thought balloons (like in comics); the workings of culture are camouflaged into nature.

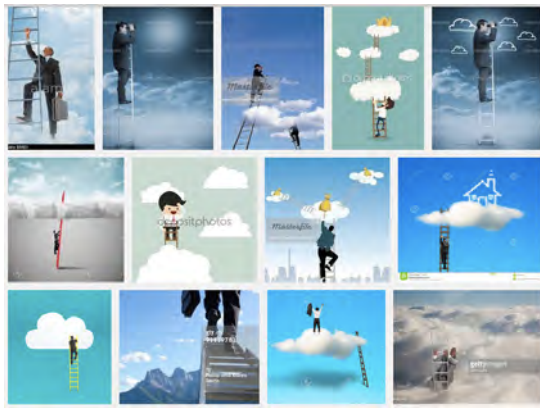


Fig. 15. Stock images of businessmen climbing to the cloud, found on the internet by Google image search.

There are more specific explanations where observing topos traditions becomes useful. By exploring image macro memes, stock photography websites, corporate advertisements and brochures, and other visual representations of cloud computing one begins to see the impact of Christian religious iconography.⁴¹ There are humans sitting on clouds, tapping their computers. Others are standing on the ground, holding their laptop computers while gazing to the skies; more often than not, “otherworldly” rays of the sun penetrate from behind the clouds. There are also images where a businessman is using a ladder to climb up to the cloud – a reference to the Biblical topos of Jacob’s Ladder (which has also given its name to a gym training machine and inspired internet memes).⁴² Websites like Shutterstock.com, which sell stock images for commercial uses, are brimming with images linking Christian mythology with businessmen or -women and cloud motifs.

Christian iconography has often depicted gods sitting on clouds looking down into the world of humans, as illusionistic *sotto in su* ceiling paintings in Renaissance and Baroque era churches demonstrate.⁴³ Such scenes were carefully, often according to programmatic ideological efforts, combined with architectural and sculptural elements to offer the visitors an illusion of transcendence. Standing under the dome and looking up, the believer was

immersed into a dizzying imaginary upward movement while being at the same time aware of one’s lot on earth. Correggio’s Assumption of the Virgin (1526-1530) at the Cathedral of Parma and Andrea Pozzo’s Glory of St Ignatius and the Society of Jesus in Sant’Ignazio, Rome (1688) are impressive examples.⁴⁴ The visual imaginary around cloud computing has reconnected itself with this topos, but in ways where the ascension to the clouds is depicted as taking place “right now” rather than as a future possibility, a “rapture” attainable through faith. Lifting computer users from their mundane, stressful and crowded environments to a miraculous and serene realm in the sky promises them values and affordances denied from earth-bound humans. Elevating the cult of magical new technology to where the Christian mythology situates heaven grants the businessman angelic powers denied from the crowd he has left behind on earth.



Fig. 16. Correggio (1489-1534), Assumption of the Virgin (1526-1530), Cathedral of Parma, Italy.

In the New Testament supernatural clouds appear in different roles. God speaks to humans from clouds, but they also serve as transportation devices to carry believers into heaven. Yet another variant appears in Revelation (Ch. XIV. 14-16), where “one [...] like a son of man” is sitting on “a white cloud.” An angel cries out, “Thrust in thy sickle and reap; for the time to reap is come; for the harvest of the earth is ripe.” In response, “he that sat on the cloud, thrust in his sickle upon the earth, and the earth was reaped.” Such allegorical supernatural acts from above have inspired rich traditions of emblemata. The “hand of god” that interferes with the lives of humans sanctifying marriages, placing rulers on thrones and causing fear and destruction is a topos that is also represented on the internet, sometimes with serious, but often with parodistic intent, as in an image macro, where a cloud-shaped hand of God is hovering in the sky, slapping (the viewer, or something unseen on the ground?) with a loud sound: “SMACK!!”

The hand of god topos is part of a wider historical tradition of motifs centered on the hand, its actions and the meanings it conveys (hands were depicted already centuries ago as writing surfaces, in anticipation of today’s tattoo fad).⁴⁵ The touch, whether of the disembodied hand of a metaphysical being or that

of a human agent, has inspired huge amounts of discursive variations. To name just one example, the medieval beliefs and rituals related with the idea of the healing touch of the king were analyzed by the French historian Marc Bloch in a famous book.⁴⁶ When it comes to cloud computing, stock photographs have given rise to a version where a hand, sometimes disembodied, but often belonging to a businessman, touches a tiny cloud. This magically activates a network of connections depicted in various ways: as clouds, icons, graphic depictions of IT devices, etc. Sometimes the cloud is framed by a transparent screen hovering in the air, forming a link with the “through the screen” topos tradition. These images can be seen as intersections of the hand of god topos and visual representations inspired by interactive computing. Interestingly, some stock images draw a link with a hand drawing a diagram on a whiteboard, revealing the low tech corporate boardroom as an additional inspiration.



Fig. 17. Stock images of businessmen sitting on clouds, found on the internet by Google image search.

The traditional hand of god topos identifies the cloud as a site of superhuman power, which certainly resonates with the interests of cloud technology proponents. The iconography of cloud computing suggests that the human protagonists who occupy the cloud want to stay there, leaving the earth behind. The supply of stock images either presents them working on the cloud or striving upward to reach it, whereas one never encounters images depicting the opposite trajectory: the return from the cloud. Bringing the fruits of cloud computing back to earth to help reverse its troubled material culture or to save its endangered ecology does not seem to be on the agenda. In that sense the cloud computing imagery deviates from the hand of god topos, which is about reaching out to the world below. If the businessmen in the clouds are the new gods and the cloud environment the heaven they have already reached, they seem to be all too content with their achievement. Perhaps the human world as it has been experienced for thousands of years does not matter for them anymore. All this projects an image of selfishness and narcissistic self-absorption, where virtualized life has taken the place of social and collective goals as they used to be known. This escapist

situation could be interpreted as a reaction to depressing reality, perhaps felt to be beyond repair.

As far as stock images can be read as representations of mentalities, it is worth paying attention to a feature that distinguishes them from the illusionistic paintings by Renaissance and Baroque era artists. In the latter the scenes are crowded, whereas in the stock imagery the computer users almost always sit alone on their own little clouds (when several characters are depicted, each has one's own cloud). Whatever connections they have with others are invisibly mediated by the device they are holding. The clouds function like private floats gently drifting in a 'sea above.' This transformation highlights the current media-cultural condition, where direct face-to-face and body-to-body contacts have been increasingly replaced by remote ones. It is worth noting that the great majority of available stock images represent young white male professionals. Attractive young white women magically poking floating 'cloud-screens' or enjoying data processing in the clouds appear, but seem to be a minority; other ethnic variants are rare. All this reflects the dominant stereotypes about social, gender and racial hierarchies underlying today's digital culture and disseminated through many different channels. However, the visual repertory of stock images is in flux and new trends and motifs appear rapidly.

CONCLUSION: “OVERCLOUDED”

Whenever a traditional crowd appears, it is depicted as something undesirable and frustrating. A perfect example is “Overclouded,” a television commercial promoting My Cloud, a personal cloud storage system by WD, a Western Digital Company (USA, 2013). We see a distant view of a cloud floating over Manhattan, with something dark lining its top; could it be a rain cloud, we wonder. Close-ups show that it's absolutely packed with people; frustration can be seen on everyone's face as they desperately try to use their devices. A small cloud - like the ones in stock images - floats by. Unusually, we see a beautiful African-American woman sitting on it, exchanging a slightly condescending smile with a male on the overclouded cloud, while comfortably tapping her tablet.⁴⁷ Another commercial presents the ideal situation brought forth by My Cloud. Tiny clouds now float over individual tablet and smartphone users, whether they are alone or with a partner or a child. Everyone has been brought back to earth to their daily surroundings - homes, airports, pleasant looking town squares and scenic elevators. In yet another My Cloud commercial, “Bring the Cloud Home,” we rush wildly through the clouds (where traces of personal photographs can be detected) and finally land in a residential home. The trope reverses the “upward mobility” of stock photography.

The advertising campaign for My Cloud is one of the most elaborate seen so far, perhaps because it promotes a concept that differs from the centralized services marketed by giants like Amazon, Microsoft, Google and Apple. Instead of some nondescript remote location, the cloud ‘resides’ in a neat little box

in one's own domestic environment. Were this concept to become popular, it might be an incentive for abandoning the cloud metaphor. The box that is prominently displayed in the commercials is in fact a miniaturized version of the massive server boxes hidden inside corporate "clouds." The commercials try to achieve their goal by engaging in a "critique" of mystifying metaphors. Toward the beginning of a longer infomercial (2013), the clouds form a question mark in the sky, while the voiceover claims: "Who wants to keep their precious content in some mysterious location?" No more clouds are seen - My Cloud users at homes and in public spaces are given the center stage. Toward the end the viewer is exhorted to "rise above that other cloud." This business-motivated "critique" is no more "radical" than the meme concocted by the US government's IT-service contractor CSC, showing clouds reflected from the glass facade of its corporate office building, stating: "Cloud computing: the greatest thing... to happen for stock photography."⁴⁸

Although My Cloud may have come to the user instead of 'rapturing' the user into the clouds, the imagery around cloud computing - arguably *The* virtual frontier of current digital culture - remains stereotypical and conservative. As topos archaeology can teach us, this is anything but a coincidence. Conservative representations, including very old religious ones, are coated with layers of "newness" and awe. They may seem out of place in today's secular society, but are used to sell new technology, including things that on the surface level are "from the future" (which can be a topos too).⁴⁹ Images of god-like humans empowered by digital technology are fed even for people who have little or nothing to do with Christian metaphysics. Of course, religious mythologies, and even cultural interpretations of clouds differ drastically around the world. The Japanese speak about "Crowd Computing" instead of "Cloud Computing," presumably because the phonetics of their language does not distinguish between "l" and "r", but perhaps also because the relationship between the collective and the individual is valued very differently in Japan compared with the Western world.⁵⁰



Fig. 18. "I know what you're thinking but this isn't where your stuff is stored. Image macro meme spreading on the internet.

Whether deliberately as a manifestation of Western pretensions to global hegemony in the realm of new technology or because of circumstantial reasons caused by the near-global reach of the internet, the Western cloud computing discourse continues to spread. The crucial questions to ask concern alternatives and ways of resistance. What else can there be beside the endless recycling of topos? Are truly radical representations possible, and what purposes would they serve? When an image macro meme depicting a glossy stock image-like view of clouds claims, "I know what you are thinking / But this isn't where your stuff is stored," it makes a point but may be too straightforward in its approach to reach a goal. It seems that "radical" in these postmodern times necessarily implies circular transformation-transportation of meanings in the form of parody, pastiche and mimicry. Culture jammers and even some creators of image macro memes have offered cunning pranks and comments that resonate with the coded mindsets of social media users who "think different" (to re-appropriate Apple's notoriously ambiguous advertising slogan). Whether such interventions will have time to have an effect before being overshadowed by something else is quite another thing.⁵¹

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ENDNOTES

1. Michel de Montaigne, *Journal de Voyage*, ed. Fausta Garavini (Paris: Gallimard, 1983).
2. My research was very much along the same lines as that of Peter Burke, as I learned nearly twenty years later from "The Discreet Charm of Milan: English Travellers in the Seventeenth Century," first published in his *Varieties of Cultural History* (Ithaca, New York: Cornell University Press, 1997), 94-110. Burke also discovered the epithets of the Italian cities as a topos (102).
3. See my "Dismantling the Fairy Engine. Media Archaeology as Topos Study," in *Media Archaeology: Approaches, Applications, and Implications*, ed. Erkki Huhtamo and Jussi Parikka (Berkeley: University of California Press, 2011), 27-47.
4. Ibid.
5. Many stories of people's beliefs in little people inside radios and TV sets can be found at www.iusedtobelieve.com. Last visited May 13, 2015.
6. Ernst Robert Curtius, *European Literature and the Latin Middle Ages*, trans. Willard R. Trask (London and Henley: Routledge & Kegan Paul, 1979 [1953]).
7. Aby Warburg, *L'Atlas Mnémosyne*, trans. Sacha Zilberfarb (Paris: L'Écarquillé - INHA, 2012).
8. See the list of publications at www.erkkihuhtamo.com.
9. www.manovich.com. These are group efforts. The latter project, winner of a Twitter Data Grant, will purportedly analyze a million Twitter images. It was publicly announced in April 2014.
10. Limor Shifman's *Memes in Digital Culture* (Cambridge, Mass.: The MIT Press, 2013) is a good and inspiring example. The special issue on "memes" of *Journal of Visual Culture*, Vol. 13, No. 3 (December 2014) also points to a new and fruitful direction.

11. Susan Blackmore, *The Meme Machine* (New York: Oxford University Press, 2000).
12. See my "Dismantling the Fairy Engine," in *Media Archaeology*.
13. Limor Shifman, "The Cultural Logic of Photo-Based Meme Genres," *Journal of Visual Culture*, Vol. 13, No. 3 (December 2014), 340-358 (341).
14. Ibid.
15. The discussion about the relationship between "meme" and "topos" would take too long here and has to be postponed to another occasion. Useful ideas, also in relation to Blackmore's book, have been presented by Ben Wetherbee (2013) in "Memes and Topoi," a series of postings at <http://benwetherbee.com>. Last visited May 9, 2015.
16. The appropriated photograph, from a *Life* magazine photo shoot in 1963, depicts the inventor and popular scientific journalist Hugo Gernsback with one of his would-be inventions.
17. Pedro Rafael Rosado, "Image Macro and Memes: Same Same but Different," www.poptechjam.com/image-macro-and-memes-same-same-but-different/. Last visited May 9, 2015.
18. Shifman, "The Cultural Logic of Photo-Based Meme Genres," 341.
19. See Kate Brideau and Charles Berret, "A Brief Introduction to Impact: 'The Meme Font,'" *Journal of Visual Culture*, Vol. 13, No. 3 (December 2014), 307-313.
20. A huge number of image macros featuring a cat and a computer (often peeking from inside) exists.
21. See the pre-internet "lolcats" and other animal images on Retronaut.com. Last visited May 9, 2015.
22. Dora and Erwin Panofsky, *Pandora's Box. The Changing Aspects of a Mythical Symbol* (New York: Harper Torchbooks, 1965 [1956]).
23. Erica Cei, a honors student at UCLA. There has been a tongue-in-cheek project of translating the Bible into "lolspeak."
24. Different political uses of memes have been discussed by Shifman in *Memes in Digital Culture*, Ch. 8 (119-150).
25. The event took place on November 18, 2011 and was widely featured in news media and blogs.
26. It is also worth mentioning a fake CNN webpage with a photo where the cop is spraying at the UC Davis students, while an embedded caption explains: "Congress Declares Pepper Spray a Vegetable. Police application beneficial to the health of protestors."
27. Roland Barthes, "Rhetoric of the Image," in: *Image Music Text*, trans. Stephen Heath (Hammersmith, London: Fontana, 1977), 32-51 (39)
28. This paragraph has profited from discussions with graduate student Hsin-Yu Lin at UCLA, Department of Design | Media Arts. See also An Xiao Mina, "Batman, Pandaman and the Blind Man: A Case Study in Social Change Memes and Internet Censorship in China," *Journal of Visual Culture*, Vol. 13, No. 3 (December 2014), 359-375.
29. Alexander Abad-Santos, "How Memes Became the Best Weapon Against Chinese Internet Censorship," *The Wire*, June 4, 2013. At www.thewire.com/global/2013/06/how-memes-became-the-best-weapon-against-chinese-internet-censorship/65877/. Last visited May 9, 2015.
30. For background, Karine Nahon & Jeff Hemsley, *Going Viral* (Cambridge, Polity: 2013). The complex relationship between meme and viral is discussed by Shifman, *Memes in Digital Culture*, Ch. 5-6 (55-97).
31. *The Guardian*, September 3, 2013.
32. Angela Watercutter, "The Bizarre Story Behind the Scarlett Johansson Falling Down Meme," *Wired*, on line, published April 3, 2014. At www.wired.com/2014/04/scarlett-johansson-meme/
33. Discussions with Professor Machiko Kusahara, Waseda University, Tokyo, have influenced my ideas about cloud computing.
34. During a Q&A at the World Wide Developer Conference, see www.youtube/watch?v=2v0OTCI2nLI. Last visited May 9, 2015.
35. The cyberspace evangelist John Perry Barlow used "DataCloud" in his article "Being in Nothingness," *Mondo 2000*, No. 2 (2000), 34-43 (43) about the "global supply of words, numbers, statistics, projections, analyses, and gossip" that "expands with thermonuclear vigor." For him it was a pejorative term, while virtual reality promised a "shared experience" and perhaps "some navigational [sic] aids through [the DataCloud]."
36. The Citrix survey's results were reported on August 30, 2012 by internet publications like Business Insider and the techspot.com. Many people pretended to know its meaning but did not. A cartoon comments on this issue. A "cloud help desk" representative says to a remote caller: "Relax madam, you're not losing all your data just because it is raining. / That only happens when there's thunderstorms."
37. Alexander Morison, *Cases of Mental Disease with Practical Observations on the Medical Treatment* (London & Edinburgh: Longman & Co. and MacLachlan & Stewart, 1828), Case XXXI, 106.
38. www.scottberkun.com/2010/cloud-computing-is-a-bad-metaphor/ (last visited May 9, 2015).
39. For clouds in painting, see Hubert Damisch, *A Theory of / Cloud /*, trans. Janet Lloyd (Stanford, Ca.: Stanford University Press, 2002).
40. The good example is the interactive installation *Cloud* (2012) by Caitlind r.c. Brown and Wayne Garrett. Usman Hague's public cloud-related installations like *Sky Ear* (2004-) and *Burple* (2006-) anticipated the cloud computing boom. Cory Arcangel's *Super Mario Clouds* (2004) now feels prophetic, although its inspiration came from elsewhere (game hacking).
41. Many explicitly religious images showing the Christian gods in cloud can be found from the internet, as well as parodies, also image macro memes. Many cartoons link gods and angels living in clouds with cloud computing. An angel says to another: "It's not boring up here - you get to look through everyone's data!"
42. In one image macro meme, the tireless Philosoraptor comments: "If there's a ladder to heaven / is there a chute to hell?" "Ladder to heaven" or "Stairway to heaven" are alternative key concepts used in many memes.
43. Such painting also represented the Counter-Reformation ideology of the Catholic church, particularly eagerly theorized by the Jesuits. The goals of the Society of Jesus were explicitly integrated to the Christian iconography by Andrea Pozzo and others. See Evonne Levy, *Propaganda and the Jesuit Baroque* (Berkeley: University of California Press, 2004), 152- 155.
44. Miriam Milman, *Trompe-l'Oeil. Painted Architecture* (New York: Skira / Rizzoli, 1986), 51-66.
45. Claire Richter Sherman, *Writing on Hands: Memory and Knowledge in Early Modern Europe* (Seattle: University of Washington Press [distr.], 2001).

46. March Bloch, *The Royal Touch: Sacred Monarchy and Scrofula in England and France*, trans. J. E. Anderson (New York: Routledge, 2015 [1924]).
47. The male has darker skin too. Other ethnicities, including an Asian-looking women, can be detected in the crowd.
48. The meme is branded as "CSC Meme" and was distributed online through their "Meme Monday" effort at google+ and elsewhere. "Meme Monday" is no doubt an effort to promote their "CSC Trusted Cloud Solutions.". In another context, an image macro with a picture of "Angry Linus" (Torvalds) stated a very rude comment. The corporation represents for many the ruthless, shady and exploitative side of the IT business sector.
49. Secularity vs. religiosity of contemporary societies remains a big question. Polls indicate that surprising numbers of Americans believe in the mythological narratives collected into the Bible, many of them verbatim.
50. This was pointed out to me by audience members when I gave a lecture about cloud computing at the Waseda University, Tokyo, in December 2014. They told me that clouds are not used in Japanese commercials for cloud computing systems. Also the metaphysical meanings of clouds are different.
51. *The Orion* made a hilarious comment on the cloud computing fad, managing to include many of the common clichés, in the form of a fake Tech Trends report where HP, often considered a "tired" old school technology company, suddenly realizes it has to get into cloud business (although it is clueless). See <https://www.youtube.com/watch?v=9ntPxdWAWq8>. Last visited May 16, 2015.



LOCATION AND NAVIGATION: WAYFARING AND ARTS OF TUNING

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ABSTRACT

Wayfaring hones our ability to discern familiar and alien settings, reinforcing our sense of drifting or belonging. Ways of wayfaring evolve technically and cognitively: while star path steering of ancient vessels meant instrument-free navigation, the “star paths” of today’s spacecraft are largely controlled by remote apparatus. Navigation can be construed as a kind of exploratory tuning whereby we access infinite or infinitesimal spatial and temporal scales, in contrast to location and situatedness which imply positioning, thus responsibility for the paths traced by our journeying. The more we develop our wayfaring skills, the more we need to celebrate (in) specific times and places through aesthetic experience that uniquely tunes our responses in and to, the Anthropocene.

DEDICATION TO AHMAD IBN MĀJID

This paper is a wayfaring exercise, an experiment in sounding ideas amongst people from different cultures and parts of the world. It is an experiment that, in this particular location, pays homage to one of the greatest Arab navigators, Ahmad ibn Mājid, born in early 15th century Julphar, now Ras Al Khaimah (the “top of the tent,” designating the northern most sheikdom of the United Arab Emirates), to a family famed for generations of sailing mastery. Ibn Mājid celebrated for his navigation skills as the *Lion of the Seas* (أسد البحار) and the *Shooting Star* (النجم اطلاق النار). His *Book of Profitable Things Concerning the First Principles and Rules of Navigation* (1490) is a still superbly accurate encyclopedia of navigational history and principles. His works describe phenomena such as lunar mansions, rhumb lines, coastal versus open-sea sailing techniques, naval routes and port locations from East Africa to Indonesia, star courses, astronomical meteorology, accounts of the monsoon and other seasonal winds, typhoons and currents. Ibn Mājid revolutionized the mariner’s compass, doubling the number of sections to 32 and improved latitude readings from the Pole Star’s position. His maps were used by Vasco da Gama to complete the route between Europe and India. Ibn Mājid was a polyglot who spoke Tamil and East African languages as well as Persian and Arabic; his writings embraced geography, religion, history, astronomy, genealogy, literature; he was a poet whose *Hawiyat* numbers over a thousand verses dealing with navigational theory. The following reflection on location and navigation, wayfaring and arts of tuning, is respectfully dedicated to Ahmad ibn Mājid, the Shooting Star, the Lion of the Seas.

I MOTU MAI I WHEA TE RIMU O TE MOANA? WHENCE WAS THE DRIFTING SEAWEEED TORN?

As a foreigner to the Persian Gulf, amongst artists exploring the theme of location, it feels fitting to cite this Māori proverb whereby one seeks to learn the origins of a stranger. Attuned to the sense of place that characterizes island nations like my Aotearoa homeland, this interrogation addresses the relationship between

sites of anchorage and belonging and plants from the sea. The drifting seaweed metaphor conveys a particular sentiment of location, since territories defined by their shores are inherently unstable because of oceanic movements. Such features bring home the importance of recognizing the different kinds of cultural models we use when thinking of place and related notions of boundaries and property. Countless location-defining models, involving concepts such as sovereignty, community, landscape, ecology, commodity, moral order and productivity, are interlinked in ways that are too often undermined or skewed. [1] Creative approaches to location require awareness of this term’s different, sometimes conflictual readings: determining the drifting seaweed’s provenance is itself a slippery issue.

Location can be construed as a kind of convergence, meaning the act of coming together, perceptively and cognitively, physically and socially, in other words, moving towards a kind of union. Convergence is therefore performative in bringing a location, a moment, an instant into existence as a salient entity in otherwise indiscriminate terrain. The sense of moving towards a shared focus, a shared concrete or symbolic site, might be seen as a prerequisite for our sense of location, the feeling of being rooted which Simone Weill calls “perhaps the most important and least recognized need of the human soul.” [2] This need is hard to define because human beings are rooted by virtue of “real, active and natural participation in the life of a community which preserves in living shape certain particular treasures of the past and certain particular expectations for the future.” [2] Rootedness and location have to do with participatory practices, shared legacies and projections. Even – or especially – in moments of voluntary exile and solitude, humans seek out vantage points that favour experience that can be relayed back for the benefit of their communities: the Prophet Muhammad’s retreats to the Gar el Hira on Jabal an-Nour mountain, Gautama Buddha’s meditation under the Bodhi tree in Bodh Gaya, Christ’s sojourn on the Mount of Temptation in the Judaeian desert. Location and the rhetorics of belonging are part of a collective ethos, a community spirit, a “coherent amalgam of practices linking habit with inhabitation.” [3] Said’s writings as a Palestinian-American raise the spectre of location’s grim opposite, namely exile: the incoherent state of those who are voluntarily or involuntarily dislocated and displaced – increasingly the case for millions of our fellow humans. Exile from overt warfare, from covert economic, political, cultural struggles, from cataclysmic events beyond our control and from transformations to our planet for which we are responsible; exile described by Said as “the unhealable rift between a human being and a native place, between the self and its true home.”

Our sense of location is anchored in the nexus of relations that make place feel native to us, embracing our existence and that of

our forebears. It is marked by an awareness of ecological, geological and cosmic times of non or extra-human place, of times beyond the Anthropocene. Such an awareness of temporalities and modes of liveness stretching beyond our own mortal presence is needed to ensure viability of that same Anthropocene and to cope with the complexities of what Louis Bec calls “our technozoosemiotic world.” [4] Bec’s term encapsulates the “biologically living/technological/data processing instrumentological” complex on which we – and the Anthropocene – henceforth increasingly depend.

WAYFARING IDIOMS, WAYWARD LANGUAGES AND VALUES

Complementary to the idea of location is that of wayfaring, forging one’s path through and across terrain. Our cultures testify to many modes of wayfaring, including aimless wandering (perhaps the sempiternal impulse behind the Debordian *dérive*), where meandering paths can lead to serendipitous discoveries – drinking water, food, a mountain, a passage, a desert, a forest, an ocean. What literally drives our journey implies and determines different relationships to locations. In willful terrestrial wayfaring practices like those of Bedouin desert dwellers (the Arabic term *badawīn* means living in the desert, while the Greek term *nomás* references pasturing flocks), mobility is in part underpinned by the pursuit of sustenance, acquired by hunting or gathering, respecting seasonal rotation to maximize resources. Yet however vital these material pursuits, to see them as sole drivers of nomadic mobility is to prioritize a commodity-related cultural model to the detriment of others (e.g. models pertaining to community, landscape, ecology and moral order, as per Thompson’s classification). [1] Reductionist views erode respect for lifestyle and location differences, and the resultant inability to grasp the complexities of major environmental transformations can be highly damaging.

Such is the case in the Sahel (meaning “shoreline” in Arabic, to denote the coastline-like vegetation of this belt delimiting the Sahara sand): although it has been prone to droughts for centuries, recent decades of over-farming and over-population have hugely accelerated desertification. Assumptions that modes of existence and wayfaring like those of the Sahel Bedouin are solely materially focused, often made by persons whose own lifestyles are thus focused, fail to acknowledge symbolic values that are at least as important as concrete necessities and commodities, in determining how we move around in, relate to and understand our environment. Human sustenance is inextricably bound up with social mores: “we and all other animals need to eat food as a matter of our biological nature, of necessity, but the choice of what we eat is part of the realm in which we exercise freedom and create culture.” [5]

Our different, often deeply embedded cultural models make it hard to weigh up the diversity of approaches to wayfaring and location. These models are moreover often couched, as in the English language used here, in tacit value-laden discursive frameworks that may not be relevant or may even be anathema to phenomena they try to address. Polarized constructs like

‘materialism’ versus ‘idealism,’ or the ‘nature/culture’ divide, may be meaningless, as in certain so-called indigenous knowledge traditions. This may also be the case in western post-humanist thinking liberated by ‘discoveries’ of distributed sentience, material agencies and other ontological turns. While these epistemological openings are in many ways welcome, they at times curiously trigger what is at best blind enthusiasm, at worst hubris, overriding the innumerable conceptions of liveness, sentience and agency that have been operative in other cultural systems for thousands of years. Surely intellectual wayfaring must, as far as possible (i.e. within the limits imposed by our enculturated standpoints), seek to engage with knowledges beyond self-referential and/or mainstream sources.

Awareness of our underpinning cultural biases is a prerequisite to more fully assuming our responsibilities within the Anthropocene, but deeply wired ways of thinking cannot be miraculously undone: superficial changes in terminologies, for example, are no magic wand. On the contrary, as pointed out by Plumwood, tokenistic breakdowns of boundaries are damaging because they facilitate the colonization and destructive assimilation of weaker elements by their stronger counterparts. We can guess which of the nature/culture or idealist/materialist components would survive if these binaries were too carelessly dissolved. Instead of quick fix terminology changes, we need to devise narratives able to accommodate deeper processes of interrogation, encouraging us to creatively think, re-think and adjust our visions beyond predominant world views.

WAKES AND WAKAS, CLOUD SIGHTINGS AND ETAK SITINGS

Some see terrain traversed by the wayfarer as a non-place, a site of transit that remains subservient to destinations which stand as the only valued places. Others value wayfaring in and for itself. They construe the act of journeying – not the arrival or anchorage – as the way to enlightenment. The latter visions are often associated with eastern philosophies: Buddhist notions of impermanence or emphasis conveyed by the very name of Tao which means ‘way,’ suggesting a road, channel, path, doctrine or line. The ephemerality of wayfaring is also valued as an actual process and as a metaphor for life, by western thinkers including Portuguese poet Antonio Machado:

*Wanderer, your footsteps are
the road and nothing more;
wanderer, there is no road,
the road is made by walking.
By walking one makes the road,
and upon glancing behind
one sees the path
that never will be trod again.
Wanderer, there is no road--
Only wakes upon the sea.
Proverbios y cantares, Campos de Castilla, 1912*

Mastery of wakes upon the sea, highly developed in the Middle East, is likewise a hallmark of Pacific cultures. Aotearoa in Māori means “the land of the Long White Cloud” spotted by land-seeking Polynesian navigators from their wakas or tribal canoes. The English name, New Zealand, is a literally double Dutch term mixing sea and land (a situation familiar to those living in The Netherlands). The first inhabitants of this geologically young country displayed extraordinary navigational prowess in their journeys thousands of miles across the Pacific. Thomas Gladwin’s study of traditional techniques in Puluwat Atoll (now Republic of Micronesia) recounts a striking approach to thinking about location and navigation in this part of the world:

“Picture yourself on a Puluwat canoe at night. The weather is clear, the stars are out, but no land is in sight [...] On either side of the canoe, water streams past, a line of turbulence and bubbles merging into a wake and disappearing into the darkness. Overhead there are stars, immovable, immutable. [...] You may travel for days on the canoe, but the stars will not go away or change their positions aside from their nightly trajectories from horizon to horizon. Hours go by, miles of water have flowed past. Yet the canoe is still underneath and the stars are still above. Back along the wake however, the island you left falls farther and farther behind, while the one toward which you are heading is hopefully drawing closer. You can see neither of them, but you know this is happening. Everything passes by the little canoe - everything except the stars by night and the sun in the day.” [6]

Puluwat navigational concepts are based on the idea that one’s vessel is stationary, whilst it is the flow of the streaming miles of water that moves, carrying seafarers from one island to another. We are literally ocean borne. Traditional navigational knowledge based on interpretation of signs observed while journeying is passed down to chosen individuals by initiation and apprenticeship: star paths, bird and marine animal sightings, drifting weeds, recognition of clouds and oceanic swell patterns, of the influence of submerged topologies on the appearance and behavior of water, are just some of the means with which navigation has been refined for thousands of human seafaring years.

Mapping abilities of indigenous Pacific mariners flexibly combine mental or ‘ghost’ topographies with real environmental cues. They demand skilled use of concepts like the Carolinian *etak*, the journey segment calculated by triangulating starting and destination points with a reference site that may be an abstraction or ‘phantom island.’ While the *etak* of sighting (an island) and *etak* of the birds (signaling proximity to land) are of fixed length (about ten miles), others differ as a function of where they occur on the overall trajectory. The *etak* allows imaginative reconstruction of the environment, where real or ‘ghost’ topography can be mobilized to read sidereal star bearings on the horizon. For anthropologist Michael Gunn, the *etak* means that “what is needed to be seen *is* seen and if it is visually obscured or non-existent then it is imagined.” [7] Traditional navigational

knowledges thus intertwine real cues and mental scaffolding – i.e. a mix of actual and virtual references, like those of our modern artifact-based computational systems – through a combination of empirical and symbol-based training.

FISH OUT OF WATER?

It is ironic that the Pacific, the place where these knowledges have been so highly developed, the biggest chunk of our hydrosphere covering a third of the Earth’s surface (more than all its land combined), inhabited by scattered groups of seafaring islanders, should be a site of acute dislocation as globally warmed waters overwhelm its populations. In 2014 a family from Tuvalu, one such doomed nation, was granted New Zealand residency on humanitarian grounds. This creates a major precedent, given that climate change induced displacement is predicted to affect up to 300 million people by 2050. Kiribati, chronologically the first nation to wake up because of where it sits on the international dateline, for all its 33 atolls and islands spread over 1.3 million square miles, has been vainly trying to wake up the rest of the world to its plight for over a decade. With a population of 100,000, its predicament is however less visible on the international stage than that of famous drowning locations like Venice or Miami. Seven years ago the Kiribati government asked Australia and New Zealand to accept its citizens as permanent refugees when they no longer have a country and launched a “migration with dignity” campaign.

As though dealing with these issues were not enough, Kiribati also has to bear the brunt of its powerful neighbors’ wrath provoked by efforts to limit fishing time demanded by the billion dollar American Samoa-based tuna industry and by parallel Asian consumer pressure (a single 222kg bluefin tuna sold for £1M at a 2013 Tokyo fishmarket auction). The imperative to reduce fishing quotas stems from the catastrophic decline in Pacific bluefin tuna breeding stock, estimated - the same year as the record-breaking Tokyo fish auction - as representing a 96% decrease with respect to unfished levels. This drop is largely imputable to indiscriminate harvesting of juveniles which rules out reproduction, thus longer-term species survival. Additionally, ruthless industrial fishing methods that decimate shark and sea turtle populations and generally destroy ecosystems, make it increasingly difficult for the islanders to feed themselves, on top of losing their land and fresh-water access.

It must be hard to keep a sense of being rooted or located, let alone a sense of dignity, as the inhabitant not just of an island but of a “sea-land” environment on which one’s lifestyle depends, that is being steadily dissolved by waves of greed, inequality and Anthropocene-imposed exile. It is tricky to raise such issues from the vantage point of a privileged cultural gathering like ISEA, marked by disturbingly heavy carbon footprints. But if we are fortunate enough to be here, we are thus uniquely placed to reflect on the responsibilities we have to assume, in keeping with our uniquely critical, communicational arts practices.

SITUATED KNOWLEDGES AND ETHICS OF LOCATEDNESS

In a text closely linked to themes of this location-focused event, Donna Haraway shows how the god's eye view of self-proclaimed scientific objectivity is just one positioning strategy amongst others, albeit one that is productive in many domains, including navigation. [8] Enriched by various remote viewing and modeling technologies, modern cartography strives to reconcile regional visions with a global overview which seemingly – if not actually, via satellite relays – emanates from on high, from above and beyond the world. But its universalist positioning makes this an ultimately irresponsible strategy: if you are not situated or located somewhere, how can you be held answerable? Haraway's questions - how to see? where to see from? what to see for? whom to see with? who gets to have more than one point of view? who gets blinded? who interprets the visual field? – open up issues of location and situation, where partiality rather than universality is the condition of making rational knowledge claims. Against top-down visions, Haraway defends politics of interpretation, translation, stuttering and the partly understood, sciences of the multiple subject with (at least) double vision, of power-sensitive conversation.

Cross-cultural anthropology emphasises the incommensurability of differing knowledge traditions because of their distinctive ontologies and epistemologies. [9] The solution is not to pretend that these differences can be reined in under some massively hegemonic umbrella – the 'god trick' denounced by Haraway – but rather to seek out new terrain – locations, situations, conversations – that can accommodate and promote pluralism. Joanna Zylińska's definition of ethics as a specific mode of locatedness resonates with ISEA's theme and related questions of artistic responsibility:

"Ethics is a mode of human locatedness in the world which involves a recognition of the processual and unstable nature not only of any such locatedness but also of the human (that is) thus located. It also involves the human in giving an account of the modes of relationality that ensue. [...] ethics is a historically contingent human mode of becoming in the world, of becoming different from the world and of narrating and taking responsibility for the nature of this difference." [10]

If our idiosyncrasy as a species resides in our need to create utopian works through scientific, artistic and technological forms of expression, this same idiosyncrasy (*idio*: personal, private, peculiar), can perhaps be read as constituting an extreme form of located knowledge. [4] Ideas of singularity and peculiarity thus bring us back to the sited and the situated. We might thus attempt to draw a parallel between the specificity of situated knowledges, i.e. knowledges mindful of locations and of the navigational processes by which they are attained and the singularity of our creative projections, which are the first step towards our being able to imagine things otherwise. Art is what I call a mutagen for the collective imagination - a vital means for us to evolve the capacity for projection on which our survival depends.

As creative extremophiles and exploratory tropists, our scope for wayfaring is extending to previously inconceivable temporal and spatial realms and scales of existence, on our planet and in the cosmos and in expanding data universes. Gone are the days when smallest and biggest could be based on obvious biome inhabitants like plankton – the original drifter, as denoted by its etymology – and the whale, its consumer and the largest animal on our planet. Today we must deal with contrasting scales and worlds, like the parallel *Umwelten* described by biosemiotician Jacob von Uexküll as the concurrent, discrete but sometimes coinciding ecological niches of different species. [11] We must expand and tune our perceptive and cognitive abilities accordingly, in ways that take into account the new relational modes and responsibilities ensuing from our technozoosemiotic natures.

TUNING TO SCALES OF BEING

One of the most unusually scaled and synchronized human missions underway today is that of the Mars Science Laboratory on Curiosity, which seeks traces of organic, possibly prebiotic chemistry to help reconstitute the Red Planet's history. The mission demands superhuman, extraterrestrial coordination: French instrumentation for carbon compound identification (SAM – Sample Analysis at Mars) is monitored from the Centre National d'Études Spatiales control room in Toulouse and technically run via NASA's Goddard Space Flight Centre in Maryland. The ChemCam laser camera system to determine rock composition, likewise part of the French payload, is also monitored at CNES and run from Los Alamos.

Interdisciplinary teams whose work depends on correlated findings jointly plan Curiosity's missions to allow time to harvest and process data for their respective needs. The Toulouse team works afternoons and evenings to synchronize shifts with partners in various US sites and others based in Ontario, Moscow and Madrid. The ultimate clock, however, to which all must work, wherever on our planet and its time zones they happen to be located, is that of Martian time. This is especially crucial because of the constraints imposed by Martian daytime: the Rover's functionality is dictated by its solar panels (there is no buffering atmosphere like ours at dawn and dusk, so thermal shock is massive). Fortunately the Martian Sol (solar day) is of a comparable duration to ours (24 hours, 39min, 35.2 seconds), yet there is still something uncanny about the antics of a collective of earthlings in different parts of the globe, tuned to "Mars time" to navigate a planet that, when it most recently neared ours in 2003, was 35 million miles away.

The need to recalibrate our cognitive, conceptual and communications apparatus to deal with the infinitely up- and downscaled universes we have generated and made accessible through our technologies was the subject of an inspiring Siggraph presentation given twenty years ago by psychologist Ron Pickett from the University of Massachusetts Lowell. Pickett compared our explorations of the nascent digital wilderness with the

expeditions of Alexander von Humboldt and Aimé Bonpland, who sailed from Europe to the Americas in 1799, scaling the Andes and canoeing into the heart of the rain forests, noting geographic, botanical, archaeological, zoological findings and creating new domains of climatology, geology, oceanography and ethnography.

Recording evidence of exotic species including un-collectable flora and fauna meant mobilizing all the senses as well as scientific instruments: they had to look and listen, touch, smell and taste specimens to describe them as fully as possible (some of their experiments were deadly for test species and von Humboldt himself was reported dead on three occasions). For Pickett, our era, like von Humboldt's two centuries ago, demands new methods and tuning of the sensorium. To locate ourselves in this instrumentalized, computationally hybridized world, we must venture into unknown terrain and learn to calibrate and hone our perception, seeking new abilities to respond (response-abilities) through the mobilization of our innate physiological and of our increasingly extended, prosthetized sensorium.

If tuning is a kind of calibration, then we need to bear in mind the fact that calibration requires the apparatus and the operator be in a specific place or location. You can only tune something or yourself, to something or someone else, if it or you are situated somewhere (echoing Haraway's insistence on situated knowledges and Zylinska's definition of ethics as a mode of human locatedness). Location and local knowledges are vulnerable because they resist closure, yet only such knowledges allow us to come up with engaged, responsible accounts of the world: rather than going from the lofty summits of universal theories to particular instantiations, we can productively think in terms of moving from one local knowledge to another, gaining abilities and agilities through this journeying, this conceptual navigation or wayfaring. For privileged, freely roving communities like ours, whose contact details increasingly consist of ubiquitous dot.org or dot.edu type means of address, attention to local knowledges and location seems all the more important.

In this wayfaring context, we need the poetic power to forge narratives as compellingly different as the magical Puluwat account of voyaging, where miles of water move around a stationary boat. We need the courage to follow the injunction of the Fisherman of Halicarnassus, Cevat Şakir Kabaağaçlı, to board a ship, steal the wind with a tiny piece of canvas and the aspiration of discovering, sailing ahead and progressing, ignoring fears of sea dangers and the possibility of death, and setting out instead to find new places, new worlds. [12] Our ship is the arts, which are our craft for sailing, for tuning our collective imagination to new possibilities and places that let us project, think and feel differently. Art works are contagious (con-tangere-to touch with). They touch us and through the arts we touch others, attaining what in Māori is called 'raranga tangata,' 'the weaving together of the people.' Through the arts, tuning and crafting idiosyncratic works that lend themselves to multiple viewpoints and

interpretations, to the upholding of dialogue and respect for otherness, we can perhaps best ensure response-able, sense-able, shareably located experience.

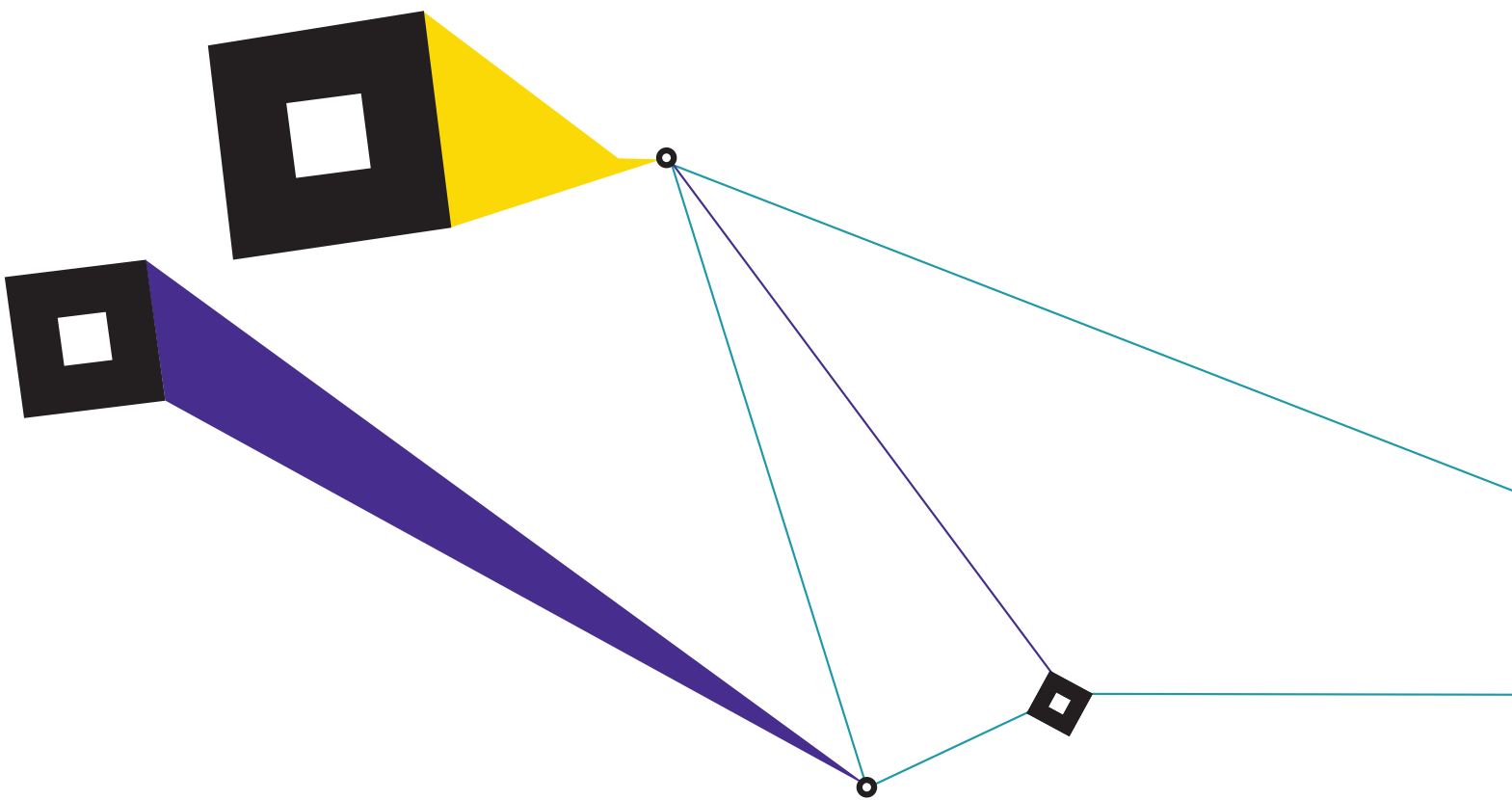
Shukrān.

ACKNOWLEDGEMENTS

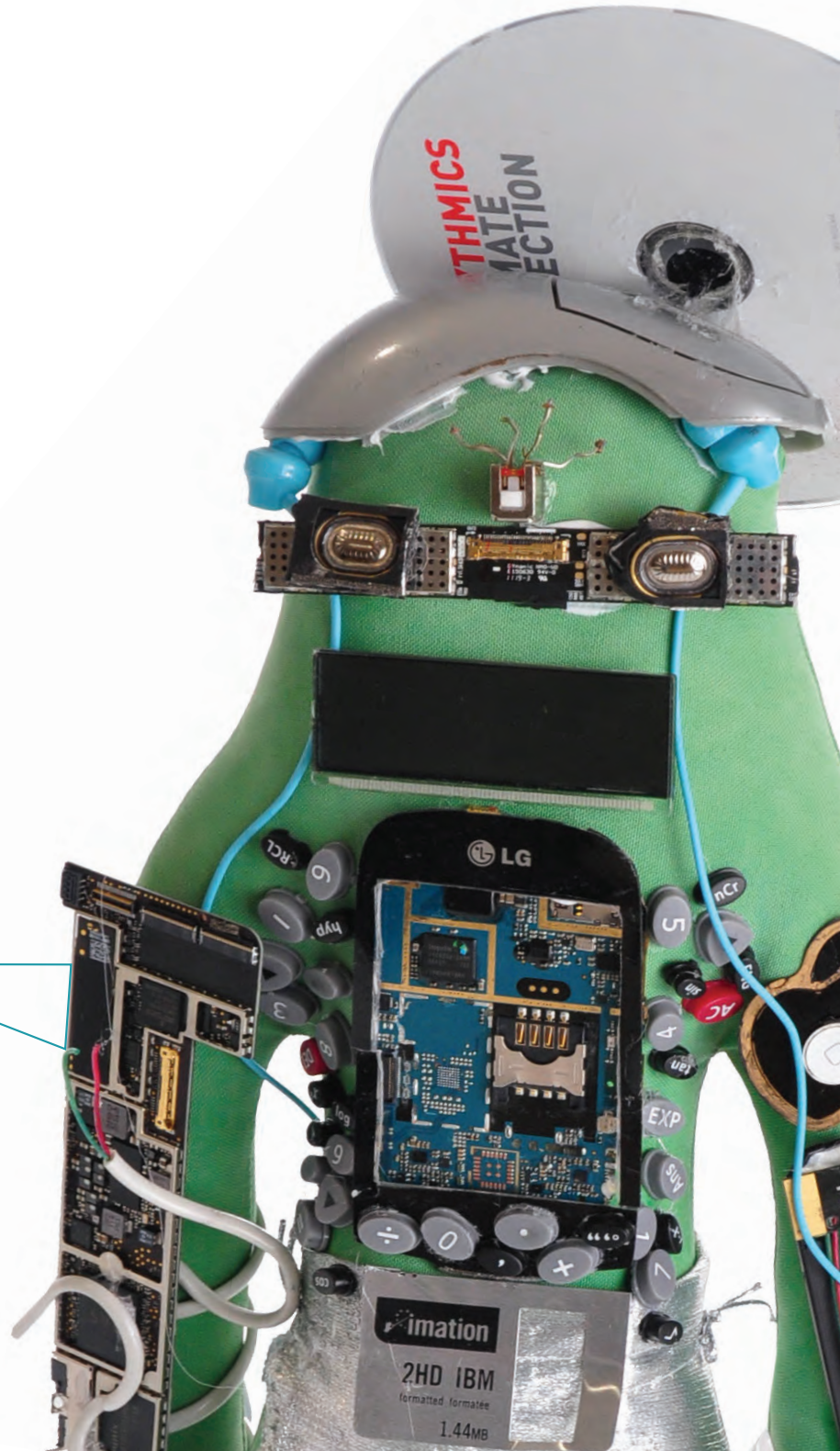
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STREAM 1 TECHNOLOGY



FLICKERING FORMALISM: THE ART OF LORNA MILLS

Presented by RM Vaughan, Toronto, Canada

It only looks like a cat.

The belly, the fur, the paws. And so it is a cat. And not.

In Lorna Mills's art, the shape of a thing is both the whole of the thing and only the shape of the thing. Both and either. In other words, don't let the form fool you: The cat is a cat and a cut-out of a cat and an animated cut-out of a cat and a metonym for cat-ness and then just a dumb, fat cat again and then we start all over.

Same here. Disco pixel boom chic-ah-lac-ah, blam, smash. Party time! Mills likes noise and gunpowder flares. It's pretty and it flashes and you could just be happy with that and walk on. But what we have here is a vivisection of an explosion, with each bit of shrapnel, each flame out and pop broken down into controllable sets of boxes, little pixel tentacles and the heart, the hot infernal heart, compressed until the atoms behave. Again, what you are seeing is the opposite of what you think you are viewing: An explosion tamed, a violence made exact and measurable. This animation is about as random as a crossword puzzle.

The warships sink in the most elegant ways, like butterflies closing their wings. Down they go, into diagram-patterned oceans made of holiday coloured shawls. I imagine a ship sinking makes an awful mess, but here we are concerned only with the shape of things. It's like ballet, but even more treacherous [...] to die in clouds of Easter Egg dye [...] there isn't enough time to consider the real world consequences and that's the point. We hardly do anymore. More pretty pixels!

And more antic fray. Houndstooth widget plumes and egg cream burns. Indigo flames and pearly hot spots, solar flares viewed through seven veils, weapons as ornament. Remember Brando's famous "The horror, the horror" scene from *Apocalypse Now*? This is what he saw and rather liked: The innate beauty of the imprecise bomb, how no two mushroom clouds, like snowflakes, can ever be the same. Everything is charming in the abstract. Fighter jets, sleek as runway models. And just as harmless (or, just as made-to-appear-harmless harmless or, just-as-harmless-as-pretty-things-ever-are harmless) [...] or, simply, liars. Here we see Mills's arch formalism at its most playful and sinister. The military jets are so adorable, schooling and criss-crossing like busy fish in an overfull aquarium. They dazzle as they blink past. We could forget why they are in the air in the first place; we could admire their clever design and, more to the point, Mills' clever re-positioning of the instruments of mass death as benign, likeable objects, something between hummingbirds and well-made cars, something cool and chic, cigarette and pencil perfect. Their phantom aftermath is no less seductive. What exactly explodes into mushy rainbows? Nothing, of course. But you were dazzled, weren't you? It is not accidental that Mills's work is silent.

Sound is like odour or scent – sound triggers associations and thus consequences. Of course, for the super-attentive, all this cascading imagery doubles back on the viewer and is read as sly commentary, with the military-industrial complex cliché rendered in Eden florals, is read as a bitch slap. For the rest of us, pretty is pretty – because we are all Formalists in this post-journalism, post-fact check, post-trust image economy. Bubbling water or a house on fire? Either will feed.



Fig. 1. Lorna Mills, *Party Manners*, 2014, still from animated gif.

Some (many) moments in Mills' menagerie. Mills is not interested in cute, she is interested in the enacting of cute. Arguably, one creates the other, but in Mills' animals-and-dumb-people slams, only the attempt, conscious or involuntary, counts. This allows her to reshape even the most heartbreakingly adorable pets and heart-rending jackass YouTube fame seekers into complementary sets, to make the seemingly dissonant elements whole or at least related and thus show how the core movement, the action (ahh, the "form") is what determines a meme's longevity, not its big eyes, fluffy puffy textures, near-nudity or superficially apparent intentions.

A dancing bear equals a crusty hippy equals a wagging tail equals a face plant equals kittens, acres of kittens equals a belching frog equals a jiggling fat man equals a car crash equals a street fight. In one of the GIFs, a dolphin puppet stares at the wrestlers writhing beneath it. The dolphin's eyes are popping out, its mouth is wide open, in a grin or a gasp. The dolphin is the viewer and the dolphin is Mills. Mills's art is always, at heart, an act of sharing. Glamour is Cute's demonic cousin. Attractive people doing unattractive things (aka glamour) remind us of our own limitations and yet also allow us to think of ourselves as having taken the high road in life. And so both iterations serve the viewer in the best way possible – they make our own foolishness more reasonable.

The idiotic (if animals can be said to be foolish) has a similar function. When Mills finds a panting, possibly murderous little rat-dog and pairs it with over-glossed lips or a horrific car crash and its too-cruel body count with a boxing match between a dog and a deer, she is having her practice both ways – swarming us

with layers of information that we digest first as content (“that dog and that woman are making the same face!” or “that guy is kicking another guy in the head!”) and then as a painfully precise collage of deep-linked visual cues, as systems of matched actions, shapes, gestures.



Fig. 2. Lorna Mills, *Party Manners*, 2014, still from animated gif.

Mills's work requires two viewings, at least. In the first, just watch and giggle. Don't look for structures and sub-structures, don't peek at the skeleton. In the second, marvel at the diamond shard cuts, at Mills' maddening sense of timing, comic and dramatic, at how Mills composes her kinetic dioramas with a ruthless attention to form and how this hyper precision creates, when the works are amassed (as they are most often displayed), a state perversely opposite from the fugue state-like dissociative and volatile imagery captured – namely, calm, the calm of being swaddled in a visual stream that induces a delicious information option paralysis. If I had a child, I would project these GIFs above its head at night, to help it sleep. This is and will be the world every child born today inherits, so why not start early?

Panic is a misunderstood blessing.

GETTING TO THE BOTTOM OF REALITY: DESIGNING CONTEXTS FOR THE EMERGENCE OF TRUTH(S) IN DOCUMENTARY VIDEOGAMES

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ABSTRACT

Documentary filmmaking and the design of videogames are often seen as two divergent art forms: the former as a medium for the filmmaker to record and share an aspect of reality with their audience and the latter as a means for the designer to give players a space to explore or create a new emergent reality. Some game designers, however, have taken on the task of creating what they call 'documentary games.' This paper will discuss the history of documentary videogame design, its relation to experimental documentary filmmaking and how documentary design process can inform traditional game design methods (and vice versa). The paper will discuss the process of an original experimental videogame that uses documentary techniques in its creation. In July of 2013 the author visited the suburb of Cachiche in Peru, a town that has a history as a refuge for witches during the Peruvian Inquisition and is in the process of developing infrastructure for 'spiritual tourism.' Staying with a *brujo* ('sorcerer'), who is actively involved in this process, the author has used the audio interview and visual documentation to create a videogame that explores the cross-cultural conflicts between the narratives constructed through the experience of an outsider and the other locally constructed narratives, perceptions and realities. To do this he is using gameplay to give the player a sense of investigative agency and the power to recombine and re-contextualize information, using a simulation of the experience of both the documentarian and documentary audience. The paper will also outline possible experiments at the crossovers between the borders of documentary filmmaking and game design.

INTRODUCTION

While working to expand the art of game design, it is important to look outside the medium to other, often very different, art forms. Sometimes the greatest insights into the unfulfilled needs of a medium come from hybrids of the original and other mediums—those that have defining elements that seemingly contradict what is seen as core definitional elements of the original medium. In this pursuit I have worked toward blending documentary film process with that of game design.

This is not entirely new: "documentary" is a term applied to a variety of video games: generally serious, journalistic games, about current topics or events. There is debate as to whether the term is descriptive or "aspirational pre-naming," an attempt by game designers to borrow from the established cultural cachet of documentaries. [1] This paper will focus less on the creation of rules by which to decide what is or isn't a documentary game or "docugame," and more on the benefits of applying elements of documentary process to game design, as well as vice versa.

The following describes a work-in-progress experiment in game design, *Cachiche*, that attempts to use documentary process to expand the expressive vocabulary of games. This is under explored territory: although most self-described documentary games use research for their nonfiction subject matter, there are processes specific to film and other journalistic work that are often not utilized, such as on-site information gathering and the incorporation of materials such as interviews. Documentary films that incorporate game-like processes in their creation will also be discussed and potential contributions of gameplay to the realm of documentary media will be provided.

I will describe the process of documentary material collection and how the current product transformed into an impressionistic interactive narrative. The paper will discuss why this process was essential and how the found content directly informed game design decisions. It will present observations on the effects of these experiments and draw attention to areas of current and future experimentation.

VIDEOGAMES + DOCUMENTARY FILM

History of Documentary Games

As stated before, the styles of games that have been given the name "documentary" are varied, making definition difficult. One approach to acknowledging the impact these games have had on documentary and game-based media would be to discuss the benefits that game context provides for documentary content. First, one can apply gameplay to a documentary in order to give the player a sense of investigative agency by simulating the system in which the documentary content takes place. One example of this technique is the game *JFK Reloaded*. [2] The player takes the role of Lee Harvey Oswald to re-enact the 1963 shooting of John F. Kennedy. With the realistic simulation of environment and physics, as well as relative freedom of movement to test hypotheses that differ from the Warren Commission's findings, the player is able to investigate the circumstances of the shooting to test the veracity of the official narrative. Created in the context of popular conspiracy theories questioning that narrative, the company states it is "the world's first mass-participation forensic construction." [2]

Another benefit that gameplay bestows on documentary material is the ability of a player to recombine and create meaning, assembling pieces of reality, as well as re-contextualize images. In a previous interactive narrative based on my two years as a development worker in Mali, West Africa, *The Mischief of Created Things*, I used this technique. [3] My process involved creating a 3D environment populated by 2D characters and objects, which the player can explore non-linearly. The player can converse with

characters and experience stories from my travels that were chosen for their personal, surprising and multilayered nature. The narratives build on one another throughout the course of gameplay, as the player recombines my stories to form a meaningful picture of the environment as a whole. The order selected to experience the narrative changes the context within which it is understood and therefore its interpretation, since experiencing some events influences the understanding of subsequent events. The recombining and re-contextualization create a surprising and non sequitur narrative that makes the non-player characters as well as the environment itself feel more plausible.

Making documentary content interactive can also assist the player in developing an empathetic response to either someone who is the subject of the documentary or the documentarian him or herself. Benjamin Poynter's *In a Permanent Save State* was created in response to news of the suicides of workers at a Foxconn factory in China that develops electronics such as iPhones. [4] Rather than create an investigative simulation surrounding the circumstances of the suicides and conditions of the factories, Poynter focuses his narrative on an imagined journey of the people who died through the stages of their afterlife. Though the game was based on real-life people, he says "I guessed in my mind what they would have wanted to see in their eternal setting, as I had visions of it myself." [5]

Another that focuses on empathy with the subject of the documentary while engaging directly with the historical context is *The Cat and the Coup*. [6] This is a surreal exploration of overthrown Iranian Prime Minister Mohammed Mossadegh's life and CIA-backed coup through the hallucinatory memories provoked by the movements of his cat. In it, the player uses the cat to disrupt Mossadegh's environment (under house arrest), forcing him to move physically through a retelling of key moments in his past. The gameplay does not simulate the political and historical narrative, but rather a jogging of the memory. Just as the player is forcing Mossadegh to relive the memories, they are also forcing themselves to remember. Both of these games take a much more fluid and impressionistic approach to the real-world subject matter than *JFK Reloaded* and provide an important alternate method, as similar philosophical contrasts are present within the documentary film community.

Game-like Documentary Film

Going in the other direction, there are a few documentary films that are created using game-like or at least interactive, processes and philosophies. The most rare are those that use actual games as influences in their construction. More common are films that expect a certain amount of cognitive interaction or detective work, on the part of the viewer to assemble facts and decide what is reality.

Apichatpong Weerasethakul's *Mysterious Object at Noon* is a documentary that involved the filmmaker visiting villages in his native Thailand and asking locals to contribute to a surrealist

exquisite corpse story. [7] On one level, the film is a fictional narrative created through an improvisational game where each subsequent person adds to a long and unpredictable story. On another level, it is a traditional documentary investigating the imaginations and collective unconscious of people living in rural Thailand. The film is composed partly of the storytelling interviews, but later on the filmmaker requests that participants act out scenes from the narrative they've created. This is revealing in a way similar to a straightforward documentary, despite the fact that the story itself is fictional. Surrealism has always had a relationship with ethnographic documentary, as they both embrace the disruption of a familiar reality. [8] This film was a major influence on the gameplay in *Cachiche*.



Fig. 1. *Cachiche*, 2014, Aaron Oldenburg, video game.

Another documentary film that incorporates a traditional game into its construction is Omer Fast's *Talk Show*. [9] Following the format of the childhood game "telephone," it begins with someone telling a true and highly-personal story to an actor who plays the role of talk show host. When the story is finished, the teller leaves, to be replaced by another actor who has not heard the story. The actor who was originally the host now assumes the role of the storyteller and recounts the narrative imperfectly as if it were their own. This continues for several rounds until the original storyteller is in the role of listener and is presented with the final divergence from their narrative. Fast's work often investigates the nature of memory and purposefully uses game-like or playful elements to create slippage between reality and fiction.

Errol Morris's *Thin Blue Line* was created through more conventional investigation, but requires of its viewers a form of cognitive interactivity, refusing to tell them to what conclusion they are to come. [10] Its story focuses on Randall Adams, unjustly convicted of murder and presents the facts of the case in an open-ended manner (which led to an overturning of the conviction). In the presentation, Morris gives multiple views of reality rather than one truth, which he allows to emerge within the viewer (although much as games do, Morris led the viewer to a conclusion that was nearest his own). Although the medium was not interactive, he bestowed cognitive investigative agency on the viewer. Unlike documentarians such as Michael Moore who incorporate an editorial philosophy into filmmaking, he did not directly dictate an interpretation of reality.

Some films go even farther toward forcing the viewer to question the narrative. Luis Buñuel's *Las Hurdes: Tierra Sin Pan* gave the viewer "the freedom to see" by accompanying its documentary content with an unreliable narrator. [11] The narrative falsifications presented over genuine documentary footage become more apparent to the viewer, requiring them to use their own critical faculties to analyze the visuals. All of these films have characteristics that are difficult to capture in real-time simulation. The presence of a camera recording what it sees gives the viewer a sense of objective observation in a way that 3D constructed simulation may struggle to emulate.

Creating a Game Using Documentary Process

One of the major benefits to the designer of adding documentary design process to the creation of electronic games is social: it requires the creator, who may spend months or years in front of the computer coding and making visuals, to go outside of their comfort zones, interviewing and inhabiting another space. It adds an element of randomness and lack of control to what, for many solo independent game designers, is often one of total imaginative control over the scope and boundaries of narrative content. In the documentary process, an interview or a turn down a particular road may change the direction of the entire project. This is particularly true if one begins without a specific game mechanic in mind and uses discovered content to dictate the appropriate gameplay.

I have an obsession with empty spaces with powerful histories as well as strange, often failed colonies of people. I create videogames that often involve documentary process. As a former Peace Corps volunteer and game designer, I have figured out how to blend two discordant parts of myself by combining the social aspects of documentary with game design.

In July of 2013 I visited the desert suburb of Cachiche in Peru, a town that has a history as a refuge for people who were considered witches during the Peruvian Inquisition, where their descendants still live and continue to practice traditional healing and fortune-telling. It is now in the process of developing infrastructure for spiritual tourism. Staying with a *brujo* ("sorcerer"

or traditional healer) named Miguel Angel, who is actively involved in that process, I have used the audio interviews and visual documentation I gathered there to begin creating a videogame that explores the cross-cultural conflicts between two narratives: one constructed through the experience of an outsider and the other constructed through local perceptions and realities. To do this I am using gameplay to give the player a sense of investigative agency and the power to recombine and re-contextualize information, using a simulation of the experience of both the documentarian and documentary audience.

During my time in Cachiche I collected not only audio from several interviews about the spiritual history of the area but photographs of textures, architecture and people to use in 3D environmental reconstruction, ambient audio and notes from interactions. I traveled there with the intent of making a game, though I did not initially know what the final gameplay would be. In preparation for the trip, I contacted a local agency to see if they could put me in contact with a *brujo* to interview and a host family with whom to stay in town, as there were no hotels. They introduced me to Don Miguel, who sounded excited about the idea of doing a documentary on Cachiche (as well as my eventual disclosure that it was a documentary game) and put me up in a dusty back room of his restaurant. He was an essential interview subject as well as a key facilitator to my experience of the town, introducing me to important people such as the daughter and grandson of a well-known local witch. The time I spent with his family and conversing with the people who worked at his bar/restaurant, observing tourists, took the game's story far outside of the documented historical narrative of the town. It was fascinating in the way that many small towns are fascinating: for the subtle, hidden interactions and magic found in the mundane.

In the months following the trip I began the process of turning this material into a videogame using the software Unity3D. The game involves generative cross-cultural narrative through the lens of spirit photography tourism. My personal documentary narrative is recombined procedurally based on the player's actions within the videogame to produce new fictionalized narratives attached to the player's in-game photography. It focuses on the tension between the static narrative created over the summer and the dynamically-changing narrative created over the course of the game.

Evolution of Gameplay: Questions and Experiments

The process of game design, through the apparent randomness of its algorithms, is a path of continuous surprise for designers. *Cachiche*, in the early stages of its process, leaned heavily toward documentary game. I, however, had the realization that using the documentary technique-derived materials to create a fictionalized narrative would allow me to get at the feeling of the space and the experience of the town, closer to what filmmaker Werner Herzog calls the "ecstatic truth." [12] For the purposes of this project, I will use John Grierson's definition of documentary as "a creative treatment of actuality." [13] I use elements of reality that

are reinterpreted through the procedures of gameplay. It functions much like Buñuel's documentary surrealism, which film critic André Bazin states is "nothing more than his concern to get to the bottom of reality." [14]

In game design there is a fixed narrative, that which the designer gives as context for gameplay and emergent narrative, that which describes the unique experience of a particular play session. In most games the two inform one another. In playtesting *Cachiche*, I have watched the narratives that emerge out of play and altered the design, including the fixed narrative, accordingly. For example, early playtests showed that players were interested in exploring the alleys between houses. Because of this I chose those locations for observable vignettes, conversations between non-player characters (NPCs) that begin when the player is in close proximity, allowing them to eavesdrop and learn about life under the surface of the small town.

CONCLUSION AND NEXT STEPS

Currently a work in progress, the game allows players to explore the town, take pictures, then show those pictures to non-player characters, whose descriptions of the photos' content is based on metadata tags added to the in-game photo at the moment it is taken. Sometimes the description is a literal interpretation of the photo, other times it's a poetic non-sequitur. In each case these photo-based stories create a new reality within the town. *Cachiche* gives the player access to its originating documentary subject matter, but allows the player to recombine and re-contextualize elements of actuality, creating meaning as they assemble pieces of reality. The player is presented with multiple stories: those created by the NPCs and what emerges in the conflicts between these stories and the 3D visual representation of the physical environment. Specific in-game events also demonstrate slippage between the official narrative and the reality peeking through from the background. The rules create a system of discovery, a conversational mechanic where the player finds that they can ask NPCs questions through their photography. It simulates the experience of the documentarian who is interested in the varying levels of reality. These are the opportunities created through the dialogue between documentary process and game design.

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HOW AND WHY I CREATED THIS FUR BALL

Laura De Decker, Canada

ABSTRACT

This paper discusses my interdisciplinary approach to art-making and provides context for thinking about the intersection of art and science. I have focused on what led to the creation of *Multi-Coloured Fur Sphere*, 2010. This image seems as though it was inspired by biology; however, the influence is less direct than it may appear. The paper has two main parts: *How* and *Why*. The first gives an overview of the more practical aspects of my work. The second part places what I am doing within a broad historical and cultural context. Modernism had a polarizing effect upon fields of study and post-modernism did not mend this. I see my work as part of a movement toward an idea of science that acknowledges our connectedness to the world we study and an idea of art that is free to use tools usually associated with science, such as mathematics and logic.

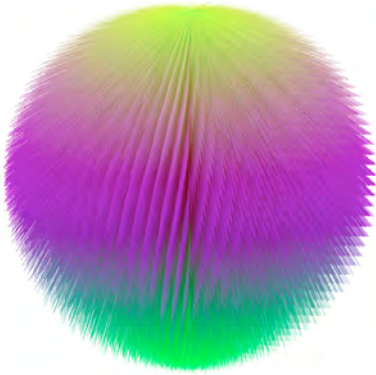


Fig. 1. *Multi-Coloured Fur Sphere*. 2010, Laura De Decker, giclée print, © Laura De Decker.

HOW

I have taken courses in art and science and am interested in epistemological issues relating to their intersection. I am curious about what I can achieve if I combine my creativity with the precision of science, logic and mathematics. I want to create something far from anything I have ever seen, something akin to the wonderment of nature, but constructed. *Multi-Coloured Fur Sphere* (Fig. 1) probably best illustrates this desire.

Johannes Itten's ideas, about "harmonious relative areas for the complementaries" after Johann Wolfgang von Goethe's writing and about aesthetic subjectivity interested me. [1] I started two series of paintings exploring aesthetic color combinations – striped paintings and the other composed with variations in composition – using tri-colored palettes. The idea behind these projects excited me but I felt I had to be more scientific to arrive at the result I was striving to reach. Conducting a quantitative experiment requires control. I had to find ways to more readily observe, manipulate, record, quantitatively describe and analyze visual information: I decided to use Red-Green-Blue (RGB) values on a computer.

I purchased Visual Basic computer programming software to make art, but without an exact idea of what I would do and little knowledge of how to use it. Computer programming was attractive to me because it allowed an opportunity to work with color both quantitatively and qualitatively. Using manuals and help files, I started designing a psychophysical experiment computer program guided by the "scientific method" as I knew it from science class. Building on ideas from my painting series, I created a "virtual" experiment where aesthetic data was collected (Fig. 2).

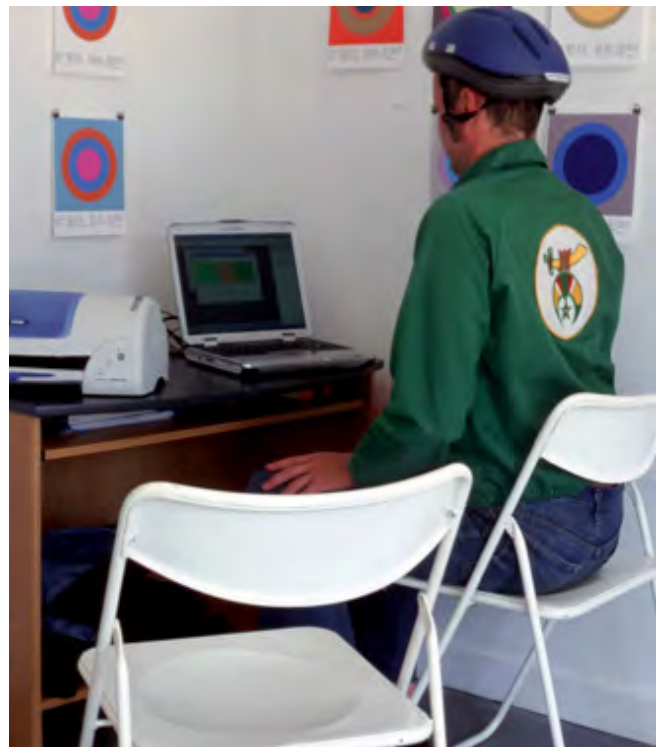


Fig. 2. *Phase 2: Inoculation*, 2002, Laura De Decker, Interactive Installation, Ministry of Casual Living, Victoria, BC, © Laura De Decker, Photo by Laura De Decker.

The experiment's first phase involved two computer-generated random-colored swatches on either side of an interactive swatch for participants to aesthetically complete the color combination by modifying the center color. I created a button in the program's user interface to cycle through all 16,777,216 RGB colors. Problems with this approach were trying to balance speed with the need to observe, limitations of the Cartesian model to show continuity of color relationships and technically how to improve the program's reaction time. I had to decide what order to nest the loops of computer code. For example I could cycle through all the blue values with every increment of green and in turn cycle through all the green values with every increment of red. There were abrupt changes when a looped variable in the program's

code returned to zero. This pulsing effect of RGB values cycling through made it difficult to see the color in context with similar colors. What has become even more evident to me is the amount of subjective input required in designing an experiment.

I wanted the participant/subject to more seamlessly navigate through color values, so I created sliders for red, green and blue. This changed the program from an empirical experiment relying more on observation and discovery of the selected color, to an artistic tool for producing a desired preconceived color.

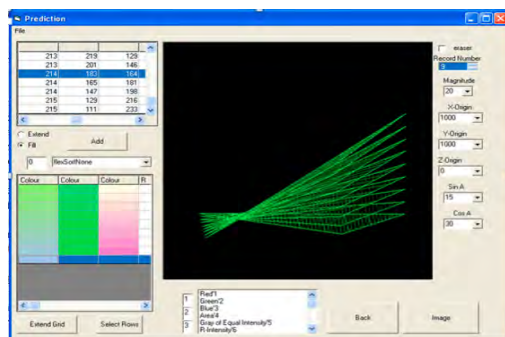


Fig. 3. *Form for Graphing and Predicting Aesthetic Colour Combinations*, 2002, Laura De Decker, interactive application, © Laura De Decker.

The experiment's second phase displayed a color combination from the first phase in a circular target composition, which preserved juxtapositions from the first phase. I chose the left color from phase one as the outer ring color, the second as the inner ring color and the third as the center color. The subjects were asked to adjust the ratio to suit their aesthetic sense.

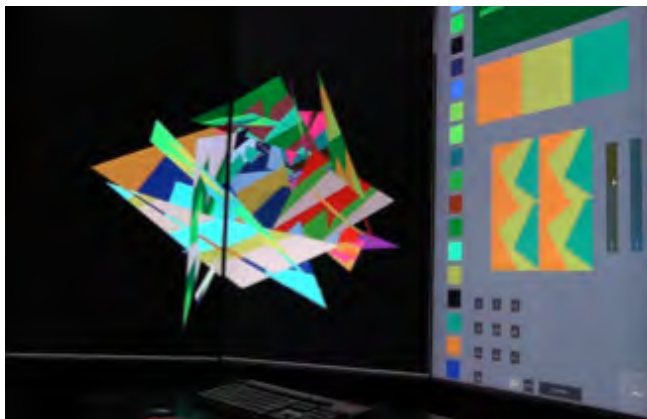


Fig. 4. *Triangulator*, 2013, Laura De Decker, interactive application, Christie Digital Personal Immersive Environment (PIE), © Laura De Decker, Photo by Stefan A. Rose.

I graphed the aesthetic data along RGB coordinates; each aesthetic record formed a triangle. I calculated color combinations based on the collected data and generated information by interpolating and extrapolating recordsets (Fig. 3). Several subjects preferred a generated color combination based on their original records over their actual choices. The experiment became

more of an extravagant color selection tool than a psychophysical experiment. The process made me enthusiastic about potential possibilities for investigating form in relation to color. There were other familiar possibilities for designing a color selection tool using color attributes such as lightness or value, hue and saturation and I knew color could be described in other color spaces. The color combinations were collected as data.

The images were printed with corresponding numerical information and displayed in the gallery. A decade later I used my program as a prototype for creating a real-time version with TouchDesigner using a multi-computer display system (Figs. 4,5) – a process which provided further insight on how I will proceed with future developments in graphing aesthetic color data.



Fig. 5. *Triangulator*, 2013, Laura De Decker, application, © Laura De Decker, Photo by Stefan A. Rose.

In breaking down my creative process into manageable parts by setting parameters and moving between sketches, code and visual feedback, I create images as a way to focus and develop knowledge visually. Some images require more rigorous methods than others, such as *Model for 16 777 216 Colours* (Fig. 6) that maintains many color attribute relationships within a single image. I was surprised by how value gradients of colors enhanced the 3D effect of the form. I used a combination of Cartesian and spherical coordinate systems allowing for more dynamic visual relationships in terms of both color and form. Mapping color to a sphere was appealing because it allowed multiple axes for navigation, rather than the three axes using RGB or four using Cyan-Magenta-Yellow-black (CMYK).

Graphing 3D virtual objects onto a 2D surface and developing a hybrid coordinate system led me to figuring out ways to transform the color model from a cube to a sphere so each color would have unique coordinates corresponding to their position. This process made me consider details in visualizing patterns and develop consistent language to describe each color's spatial

location, so I can transition or animate from one form to another. (Figs. 7, 8) The process involved many sketches (Fig. 9) to determine what transposes to where.

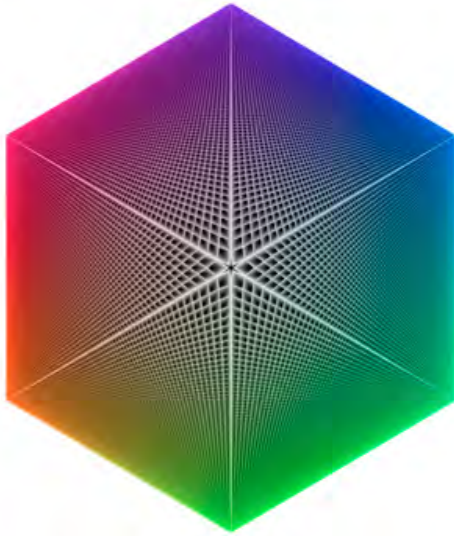


Fig. 6. *Model for 16 777 216 Colours*, 2007, Laura De Decker, giclée print, © Laura De Decker.



Fig. 7. *April 4 from Project 365*, 2011, Laura De Decker, digital file, © Laura De Decker.

Multi-Coloured Fur Sphere (Fig. 1) came out of a more playful exploration of diverse approaches to graphing spherical forms. I was interested in the plurality of architectural hybrid spherical forms constructed of Euclidean geometry. Working directly with the entire code, rather than as discrete computational objects, was essential for producing variants of form and allowed me to more intuitively alter the code. *Wind-Swept Sphere* (Fig. 10) and *Finned Sphere* (Fig. 11) resulted from this process as evidenced by formal similarities in some of their apparent features. For example, *Wind-Swept Sphere* uses a nested loop whereas there is an extra incrementing loop nested in the code for the other two creating a tightly wound helix. Subsequently when I wanted to animate *Wind-Swept Sphere* I added the extra loop so it could

coil. (Fig. 12) For *Multi-Coloured Fur Sphere* (Fig. 1), I mapped color using common variables. I typed in RGB values incorporating variables used in graphing the form in a way that I guessed might be interesting. The colors related to variables that described the form: the red value increases toward the top and from the vertical axis, green correlates to distance from the equator and blue corresponds to distance from the vertical axis. For the first time in my process, I used color to enhance the features of the form rather than the form to display color.

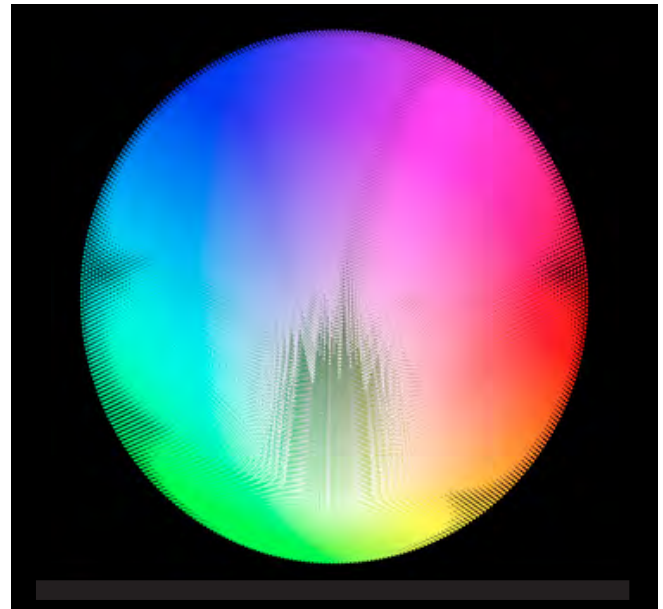


Fig. 8. *Untitled*, 2012, Laura De Decker, digital file, © Laura De Decker.

My strategy became to be fluent in writing code rather than to create my own graphics software. However, I find sketching with pen rather than keyboard to be helpful in my creative process. The challenge is to make the names of things most intuitive, balancing a need for both comprehension and flexibility since my focus shifts – for example from the boundaries of spaces to the spaces themselves. Slightly vague but consistent language seems to work best. The code for a 2D print can be mathematically modified so the coordinates for a 3D model version of the 2D image can be deduced from my code. In a sense the object of my work can be defined in several ways as: 2D image, virtual object (Figs. 13-15), code or an idea.

In the quest for precision, interesting questions arise. Areas for further research include subjectivity in graphing 3D forms on 2D surfaces. There is a shifting threshold for what can be calculated, for the rest I rely on my eye. A seemingly simple question like how to distort a disk in space to account for perspective can be an increasingly complex problem. Questions like this led me to doubt that the epistemological framework for art and science was as explicit as it seemed, given everywhere I turn eventually requires my subjective interpretation.

WHY

Background

Multi-Coloured Fur Sphere (Fig. 1) stood out because this fur ball gave me an aesthetic experience like the feeling of learning something new and surprising or when something clicks or comes together. Sometimes there isn't a prelude to what the programmed image will look like, in contrast to painting, so I see it more in the way one would encounter someone else's work or nature.

I want to bring together things often deemed opposite such as object and subject, art and science and theory and practice. In trying to articulate my own position and epistemological framework, laying the groundwork for my interdisciplinary practice, I came across others who had broadened their scope in search of similar intersections from other fields.

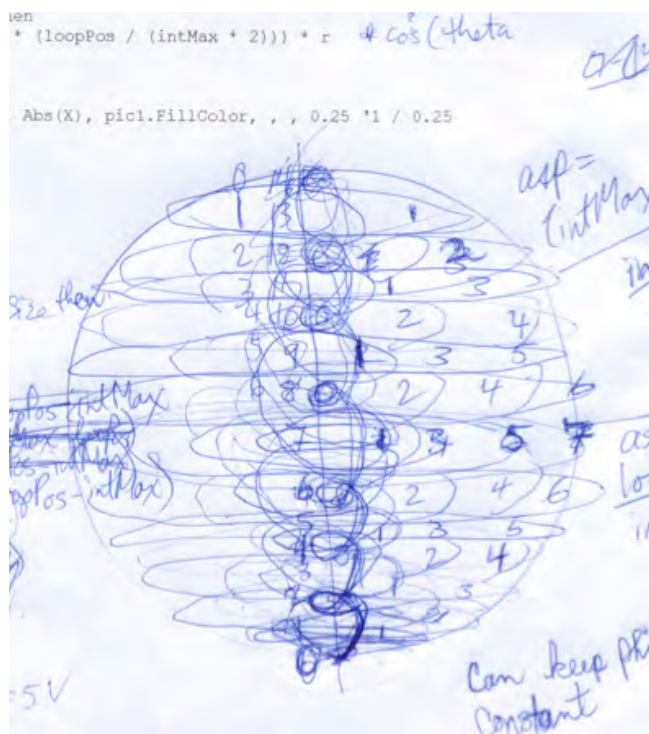


Fig. 9. *Untitled*, 2010, Laura De Decker, preliminary sketch and notes, © Laura De Decker.

Pre-Modernism

Herman Weyl's *Philosophy of Mathematics and Natural Science* discusses the importance of symbols in the development of mathematics with regard to Indian and Buddhist literature that delights in possibilities of combining mathematical operations (i.e. addition, multiplication and exponentiation) to produce very large numbers using a position system, in contrast to today's well-known base-ten position system: "the human mind for the first time senses its full power to fly, through the use of the symbol, beyond the boundaries of what is attainable by intuition." [2] Eastern analytic geometry translated geometry into algebra using fractions

and irrational numbers, making it useful for measuring in addition to counting; the Greeks had reverted back to the algebraic traditions of the Sumerians, Indians and Arabs because they were, "deterred from this step because they took the discovery of the irrational seriously." [3] Iain McGilchrist in *The Master and his Emissary: The Divided Brain and the Making of the Western World* writes that after a thousand years the idea of the sphere re-emerges in the West during the Renaissance. [4] This coincides with Leonardo Da Vinci's curiosity-driven hands-on mastery of material and subject matter at the core of his contribution to both art and science: "Leonardo's anatomy thus proceeded from questions which even the medical schools of the time had not asked: for example, what happens beneath the skin when a man steps forward, kneels, stretches out his arm and grips a rod?" [5] The Renaissance led to the Enlightenment and the post-classical West made achievements in geometry independent of the East, "only after the science of space, through Descartes' *Géométrie* (1637), became subjected to algebraic calculus." [6] However, Cartesian philosophy was criticized for its diminishing affect on culture: Vico Giambattista was critical of narrow focus at the expense of cultural wisdom. [7]

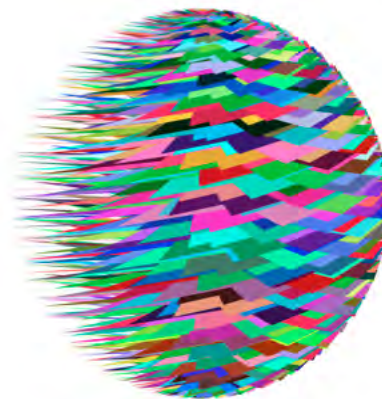


Fig. 10. *Wind-Swept Sphere*, 2009, Laura De Decker, giclée print, © Laura De Decker.

Isaac Newton's *Opticks* and Goethe's *Theory of Colours* are often considered emblematic of the dichotomy between quantitative and qualitative methods in science. While Goethe might be most celebrated for his epic play *Faust*, he felt his *Theory of Colours* was most significant because it countered the ripple effect of Newton's discoveries which were drastically transforming the world: "He believed it his duty to set everybody straight." [8] However, it was Newton's followers who had neglected the subjectivity of color. [9] Bruce Elder's *Harmony and Dissent: Film and Avant-garde Art Movements in the Early Twentieth Century* points out: "Goethe challenged Newton's assumption that colour is an intrinsic property of light; [...] he contended that colour emerged as a condition of light's environment." [10] Brian Cantwell Smith's *On the Origin of Objects* notes, John Maynard Keynes referred to Newton as, "the last of the magicians, the last of the Babylonians and Sumerians." [11] Although most scientists

of Goethe's time saw little value in Goethean science, today his approach is taken more seriously. [12] Goethe also understood the power of mathematics and geometry but cautioned people from ignoring other approaches to scientific study of colour, including aesthetics. Regarding the theory of colours, "progress has been incalculably retarded by having been mixed up with optics generally, a science which cannot dispense with mathematics; whereas the theory of colours, in strictness, may be investigated quite independently of optics." [13] Goethe's work not only provides empirical observation of color from many field perspectives; his aphoristic writing communicates insight about his world in eighteenth and nineteenth centuries. [14] He had found ways to express the limitations of a burgeoning modernist way of thinking which had become increasingly objective at the cost of subjectivity.

Modernism

Weyl sees physics as foundational to biology: "As long as progress from simple to more complicated configurations remains the methodologically sound way of science, biology will rest on physics and not the other way around." [15] Smith contradicts this notion of the modernist "hierarchy of nature" point of view which he finds cramped: "[it] views everything as built up out of the formal ingredients of particle physics, held together with the abstract epoxy of set theory, logic and mathematics, stakes a claim to realism and foundationalism, but (at least at first blush) does so at the expense of pluralism and irreduction." [16] The notion of the "death of the author" and "death of painting" was a symptom of this way of thinking. [17] Rudolf Arnheim explains why the reductionist model is too simple, "what I have called 'modular thinking' is defeated by the fact that as we ascend the scale from the atomically small to the astronomically large we encounter levels of near-chaos, which disrupt the continuity of order." [18] What was good about modernism was its realism – that we share one world. [19] A closer look at history contradicts stereotypes of modernism and reveals its nuances.

Early twentieth century vanguard artists were interested in ideas that went beyond the mechanistic world-view often associated with modernism. For example Lawren S. Harris and Wassily Kandinsky were interested in ideas of underlying universal laws that connected everything, found in theosophy and theories about the fourth dimension. [20] Both Eastern (in relation to Hinduism and Buddhism) and Western ideas were incorporated into The Theosophical Society created by Helena Blavatsky in 1875 in New York. [21] Elder outlines threads between generations of artists: "[Viking] Eggeling and [Hans] Richter's ideas about colour and form were influenced by Blavatsky, [Rudolf] Steiner, [Charles] Leadbeater and, above all, Kandinsky (especially by Kandinsky's version of Goethe's colour theory)." [22] He makes the case that key movements of modern art, "the project to develop an abstract art based on a conception or pure visuality and Constructivism," have a complex relationship with what modernism came to mean. [23] As Elder states, some artists saw cinema as a way of regaining

a more holistic understanding of the world: "a universal, transcendental art might yet come forth, might yet reunite the arts, might yet re-enchant the world [...] and so sway the mind toward a creator-unity immanent in nature – that a new art might yet come forth that could fully express the artist's mind." [24] The ability to communicate experience so directly was an artistic counterpart to modern science. The concept of modern aesthetics and philosophy of art was part of a trend in aspirations for grand theories – a shift away from technical concerns toward general ideas. [25]

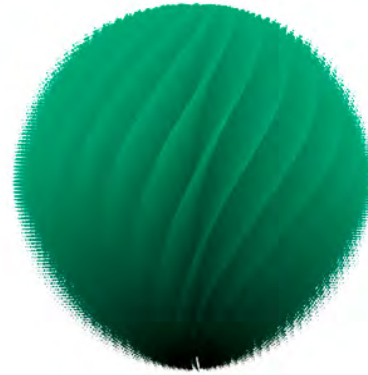


Fig. 11. *Finned Sphere*, 2010, Laura De Decker, giclée print, © Laura De Decker.

McGilchrist describes modernism's features as: excess consciousness and explicitness with regard to what should be intuitive and implicit, depersonalization and alienation from body and emotion, disruption of context, fragmentation of experience and loss of sense of 'betweenness.' [26] He suggests the dominance of left-brain thinking as the culprit for the apparent chasm between art and science, since he describes the left-hemisphere value as, "making explicit, but this is a staging post, an intermediate level of the 'processing' of experience, never the starting point or end point, never the deepest or the final, level." [27] Progress is more organic: "advances of science are often the result of chance observations, the obsessions of particular personalities and intuitions that can be positively inhibited by too rigid a structure, method or world view," and "Technological advances [are often] the results of local enthusiasts or skilled artisans attempting empirically to solve a local problem." [28]

Combining technical capabilities and curiosity allows for the most surprising breakthroughs. Whether referencing the advent of cinema or computers, technical knowledge and creative approaches were required for these new technologies and standard methods had not yet been developed. This grappling with media and methods engages right brain thinking: "Problem solving [...] may become harder if we become conscious of the process." [29] In Jasia Reichardt's *The Computer in Art*, with rare exception the general theme seems to be that artists who were interested in creating art using computer programming learned to do programming rather than rely on a collaborator. [30] The Tokyo Computer Technique Group (CTG) thought, "one of the major underlying possibilities of computer art is that the 'artist'

actually designs a system – a method of producing a given repertoire of forms and generating patterns.” [31] Input for the system could come from a ‘random’ or a sensory source. From the artist’s perspective, it was difficult to create something artistic without having an understanding of the technology itself. Likewise it was hard to create art without being subjective. Haruki Tsuchiya, systems engineer for CTG, stated in a letter to Reichardt, “While producing computer art, I found myself staying still as an engineer, but not the same as before.” [32] He later wrote: “I would like to be a man, not artist, not engineer, a man.” [33]

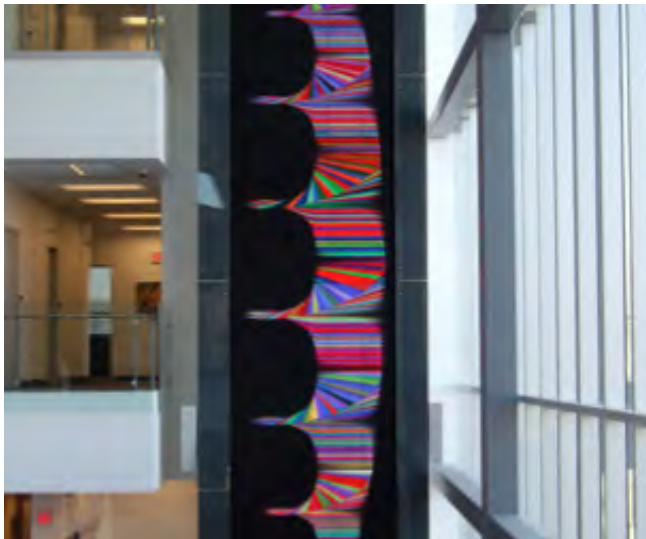


Fig. 12. *Wrestling with Wind-Swept Sphere*, 2013, video animation on Christie MicroTiles, © Laura De Decker, Photo by Stefan A. Rose.

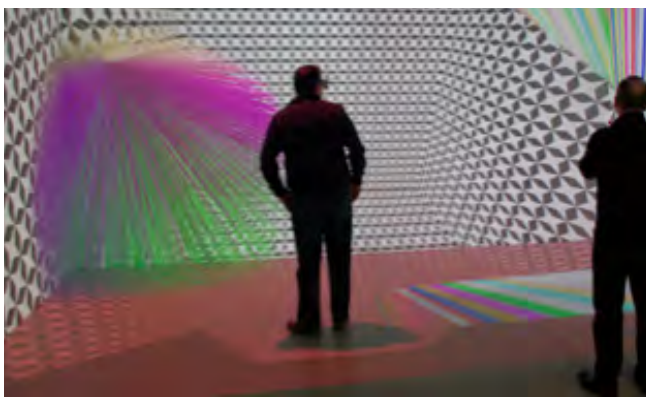


Fig. 13. *Composition with Multi-Coloured Fur Sphere*, 2013, interactive model, Christie Digital Cave (CAVE), © Laura De Decker, Photo by Stefan A. Rose.

Post-Modernism

Modernism was seen as a dead-end and post-modernism a reaction against linear and reductionist ways of thinking. McGilchrist writes, “The art of the past is ‘placed,’ ironised or rendered absurdly incongruous. And if art can be anywhere or anything – literally a pile of garbage, perhaps – this aims to abolish the beautiful, without needing even to say ‘everything and

everywhere is equally beautiful.” [34] He goes on: “Through these assaults of the left hemisphere on the body, spirituality and art, essentially mocking, discounting or dismantling what it does not understand and cannot use, we are at risk of becoming trapped in the I-it world.” [35] Smith has a more sympathetic understanding of the post-modernists’ plight: “Certain forms of post-modern criticism avoid foundationalism, but sacrifice realism in the process and curiously enough remain reductionist, particularly with respect to categories of text, discourse, sign and the like.” [36] Arnheim is also critical of the basis for reductionist thinking: “Such reasoning, however, has to be met with caution. It is modular thinking, based on the oversimplified assumption that the macroscopic world is a mere multiplication of a smallest unit.” [37] Genetics gives a sense of chaos and the magnitude of the challenge of unraveling such complexity.

Transposable elements get inserted into DNA, move around and can have some sort of effect, but seem to be inconsequential and create spacing in the genome. [38] Eric Lander uses a metaphor to illustrate why transposable elements’ relationships to the rest of the genome is complicated, by imagining stacks of papers in a messy attic as being such elements: “you put a cup of coffee down on top of a stack of papers, those papers may be utterly irrelevant, but now they’re holding up that cup of coffee [...] And if you were to just [...] get rid of them, the cup of coffee would come crashing to the ground.” [39] These otherwise useless pieces of code have become part of the context for genes of interest. These spaces happen to be very useful in interpreting genes, along with some ingenuity from expertise in other fields. For example, a graduate student of computer science found a sequencing error that changed the interpretation of two genes into one gene, based on comparison between sequences from other species. [40] What seems extraneous to the subject matter of focus can become significant for developing methods of research and exemplifies the complex relationship between method and subject matter.

Knowledge including scientific knowledge relies on observation: “The subjectivity of sense qualities must be maintained in two regards, one philosophical, the other scientific.” [41] Biology is usually associated with detailed categorization and use of comparative qualitative data, in comparison to physics’ search for unifying laws and its use of quantitative data. Weyl references Stuart Mill: “if we wish to learn the effects of a cause we may experiment; but if we wish to learn the cause of an effect we have to rely purely on observation.” [42] For example, biophysics researchers looked to the world they knew for hypotheses to determine how motor protein Myosin V – a molecule that transports organelles – moves along long thin structures within cells called actin filaments. Researchers came up with two different models to explain this motion: hand-over-hand like a monkey swinging through trees or like an inchworm. [43] An experiment was designed using strategically placed fluorescent labels on parts of the protein to help rule out one of the prospective models by

visual analysis. [44] By working on a problem from both sides it was confirmed, as the title of the publication indicates, “Myosin V walks hand-over-hand.” [45]

Science, mathematics and logic are sometimes oversimplified and misunderstood. Weyl quotes Immanuel Kant: “mathematics possesses a content that is secure independently of all logic and therefore can never be based upon logic alone.” [46] Smith states the consequences of a participatory metaphysics on mathematical practice “will disrupt its boundaries, splitting what has seemed an integral study into a web of cross-cutting currents that not only interpenetrate with others inside the mathematical realm, but that weave and course through the rest of society’s intellectual practice as well.” [47] In *The Trouble with Physics: The Rise of String Theory, the Fall of a Science and What Comes Next*, Lee Smolin writes of his interactions with Paul Feyerabend, “he argued – convincingly, in my view – that science would grind to a halt were the ‘method’s’ rules always followed.” [48] McGilchrist echoes this sentiment: “Virtually every great physicist of the last century [...] has made the same point. A leap of faith is involved, for scientists as much as anyone.” [49] Smolin acknowledges science’s interconnectedness with other disciplines and life: “The scientific community is thus both an ethical and an imaginative community.” [50]



Fig. 14. *Composition with Multi-Coloured Fur Sphere*, 2013, detail with 3D position-tracking glasses, © Laura De Decker, Photo by Stefan A. Rose.

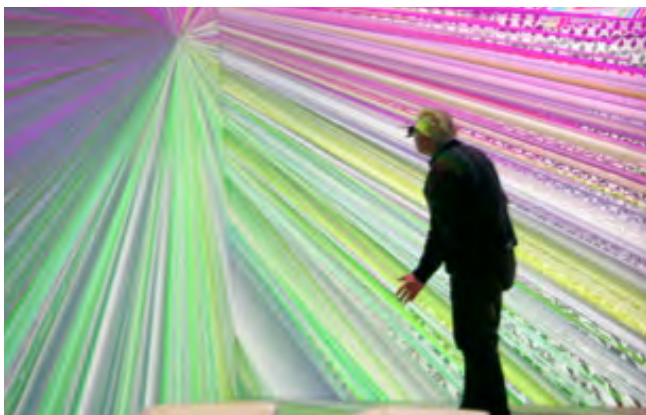


Fig. 15. *Composition with Multi-Coloured Fur Sphere*, 2013, © Laura De Decker, Photo by Stefan A. Rose.

Arnheim expresses a need for balance between scientific analysis and artistic expression: “As long as the analysis of rational shape remains a tool of the fully developed mind it can help to make perceived order explicit. When it replaces vision and stifles expression it becomes a game in vacuo.” [51] Whether using a scientific model or language, it must be remembered that it is a tool, an abstraction of reality. Post-modernism’s legacy is pluralism. [52]

CONCLUSION

Several authors recognize the pervasive cultural divide between science and art. Weyl states, “what is darkest for theory [...] is the most luminous for the understanding from within; and to the elementary inorganic processes, that are most easily approachable by theory, interpretation finds no access whatsoever.” [53] The schism is not between art and science: Smith characterizes it as being between the “academic–cum–intellectual–cum–technological” and “the curious, the erotic, the spiritual, the playful, the humane, the moral, the artistic, the political and the sheerly obstreperous” and continues, “That is the divide that tears us apart; not the walls between this and that academic department.” [54] McGilchrist writes, “Ultimately what we cannot afford to keep deferring is a regrounding of both art and science in the lived world.” [55] They also give us some insight into how to proceed with interdisciplinary activity.

Smith is devoted to finding a balance between realism and constructivism by developing a new metaphysical foundation for an epistemological outlook that doesn’t fall into reductionism. In reference to Keynes he states, “the problem with current computer science [...] is [...] that we are *post-Newtonian*, in the sense of being inappropriately wedded to a particular reductionist form of scientism, inapplicable to so rich an intentional phenomenon [...] Maybe, instead, we need a new generation of magicians.” [56] He proposes a participatory successor metaphysics that takes the best of modern and post-modern metaphysics and gets rid of the problematic aspects. [57] In this metaphysical model material objects occupy a middle ground between the typical notion of the physical and intentional world: “registration and materiality, on this metaphysics, play a role that syntax was asked to play in the prior metaphysics.” [58] Smith asks “how does one describe the content of the vague and tentative sketches that are so crucial in early stages of architectural design, for example?” [59] This relates back to my use of vague but consistent language as a way to distance myself from too strict a definition in terms of computational objects. Smith writes: “coding up the details of task-specific domains is the job of users of object-oriented languages, not of their designers.” [60] Compositional achievement is the domain of both subject and object. [61] “If registration is participatory, so too must theory construction be.” [62] In other words, theory and practice intersect.

McGilchrist discusses our ability to look beyond the epistemological systems we use: “we may be willing to accept the existence of a reality beyond language or rationality [...] because our mind as a

whole can intuit that aspects of our experience lie beyond either of these closed systems.” [63] The perception – as opposed to the categorization and naming – of color is associated with the right fusiform area of the brain. [64] In addition, maybe an awareness of the brain’s tendencies would facilitate an openness to develop a more holistic view. There is hope for societies plagued by over abundant left-brain thinking, which is more indicative of the West: They can learn from parts of the East. [65]

Weyl finds the combination of color and geometry significant: “Epistemologically it is not without interest that in addition to ordinary space there exists quite another domain of intuitively given entities, namely the colors, which forms a continuum capable of geometric treatment.” [66] My fascination with color has been a springboard into improving the communication between both hemispheres of my brain and developing knowledge. The subject matter has served as a starting point to more complex ideas and a guide for my intuition.

Even though *Multi-Coloured Fur Sphere* (Fig. 1) was created using math and logic, it was constructed as much as it was found and created the content to relate to the interdisciplinary ideas discussed in this paper. We actively adopt imperfect ways of gauging the world since we are never really separate from what we perceive. Perhaps that is just part of the limitation or beauty, of being human. What we will never understand completely, we nonetheless get to use and experience.

ACKNOWLEDGEMENT

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LOCATING THE TERRITORY

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ABSTRACT

The advent of smart phones equipped with GPS technologies and constant connection to the internet has fostered a suite of applications allowing developers and owners to associate data and information with physical locations. Longitudinal and latitudinal coordinates create geofences around physical locations and platforms such as FourSquare use a combination of established addresses and crowd sourcing to add locations to their database. FourSquare as a social media game, with members vying to become the mayor of a location, has led to the FourSquare database becoming amongst the largest and most active index of georeferenced places on the internet. The virtuous circle of users of the mobile app, ascribing their attachment to a place by 'checking-in,' and places wanting to be part of a global map, means to have your longitude and latitude in the FourSquare database is an important survival strategy. The database is the new map and if you're not in it, you won't be on it. In this paper the authors present a series of funded research projects that introduce the application of locative media to moving things: people, buses, clouds and basemaps.

WHAT IS YOUR LOCATION?

In the emerging battleground for locative media services, Google Maps appear to have a distinct advantage, dominating mapping services (43% market share), however, it transpires that they do not own all of the data that matters to people. Owning a base map is one thing, but owning a database of coordinates that people tag as valuable is likely to be even more prized. In digital and network mapping, the numbers that are in the database that refer to longitudes and latitudes are becoming the new map. Numbers that are placed in the database by ordinary people and not cartographers or institutions. This paper presents projects in which personal and social databases are developed that correspond to specific groups and communities..

WHO ARE YOU?

It is arrogant to presume that all potential users will have the same recognition and understanding of cartography and basemaps currently in distribution. What if the users have an unreliable or unestablished relation to cartography? How do we design for and work with user groups to prevent technological marginalization through factors such as disability or social and cultural issues?

This papers attempts to address this question through the presentation of three research projects: *Mapping & Tracking* and *Spatial Memories*, which use participatory design methods to create and use locative media tools with users who have a wide spectrum of learning disabilities and the LinkLocal application that was developed for the Wester Hailes community in Edinburgh, Scotland to explore community sharing.

MAPPING & TRACKING

Mapping & Tracking was a short-term participatory, collaborative project, exploring GPS tracking via mobile devices as a performative drawing material, blending technology and creativity. Using the Forth Valley Royal Hospital, Larbert, Scotland and the surrounding forest as a canvas, the project was a collaboration between artist, lecturer and researcher Beverley Hood, visual artist Sharon Quigley, audio-visual artist Emma Bowen and participants of the Abrupt Encounters program (<http://www.abruptencounters.com/>). Abrupt Encounters was a live arts programme developed by a collective of creatively engaged participants with learning disabilities predominantly from Central Scotland organised by Artlink Central, a leading participatory arts agency in central Scotland. [1] The Abrupt Encounters group have a broad range of disabilities from autism, partial sight, focus and memory issues, Downs, epilepsy and motor coordination problems, some living independently, some in supported housing, with an age range from 17 to 70. The *Mapping & Tracking* project attempted to establish an open, collective and participatory dynamic within the group, where all participants were engaged as active performers and contributors.



Fig. 1. *Mapping & Tracking* GPS walk, 2013, Abrupt Encounters, locative media, © Emma Bowen.

Over a two week research and development period, the project group collectively explored the Larbert forest, its trails, desire lines and off-road routes through a series of daily walks, undertaken to generate a series of digital GPS drawings, as alternative systems of mapping. The project used locative media as a way for participatory creative practice "to renew with the tradition of site-specific art that left the rarefied air of museum and gallery to investigate the world outside." [2] The group utilised 8 Apple iPhones, with two GPS tracking Apps installed, FieldTripGB a freely available App developed by Edina and GeoArtist, a pilot App, developed specifically for the project by App Development company Bluemungus.

Methods of engagement with the technology included both passive and active. Passive engagement with the technology included exploratory walks to familiarise group with the local environment, nature walks led by Forestry Commission Ranger and gamified approaches to landscape adopting classic game premises such as “follow my leader.” The active methods of engagement with the technology included creating intentional shapes and adopting other gaming premises as the basis for performative drawing techniques, such as dot-to-dot. In both methods participants held, passed and wore iphones via armbands.

These methods operate as a contemporary extension to the methods of British artist Richard Long, which he defines as “simple creative acts of walking and marking about place, locality, time, distance and measurement. Works using raw materials and my human scale in the reality of landscapes,” similarly exemplified in recent works by Jeremy Wood, Masaki Fujihata and historical and contemporary psychogeographic practice. [3]



Fig. 2. *Mapping & Tracking GPS walk*, 2013, Abrupt Encounters, locative media, © Alicia Bruce.

Coined in 1955 by Guy Debord as “the study of the precise laws and specific effects of the geographical environment, consciously organized or not, on the emotions and behavior of individuals”

psychogeography was itself an extension upon Baudelaire’s ‘urban wanderer,’ the flâneur, writing the city through the action of walking. [4] The Situationists created the action ‘Dérive,’ to drift, as a psychogeographic procedure, which has more recently been developed in multiplicitous incarnations as a variety of Apps, including *Dérive*, developed at V2 and led by Eduardo Cachucho, Drift, developed by Justin Langlois in collaboration with Broken City Lab and Mark Shepard’s Serendipitor.

The locative methods used revealed a cartographic naivety within some of the *Mapping & Tracking* participants, in particular some members of the group struggled to identify their own location on the map and to be able to identify common cartographic symbols within British Ordinance Survey maps. This was addressed and a general working knowledge developed over the two weeks by walking the landscape, monitoring the maps out in the field on phones and reinforcing this through the use of paper based maps both on location and back at the project space, within the hospital. As part of the participatory workshop sessions, the group also explored alternative visual mapping, as creative exercises to develop idiosyncratic and personal systems using cartographic symbols as starting point.

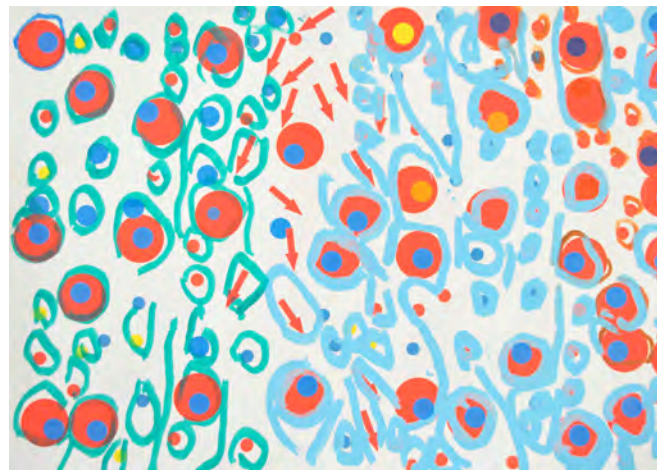


Fig. 3. *Mapping & Tracking mapping exercises*, 2013, Abrupt Encounters, pen on paper © Emma Bowen.

Specific methods also elicited specific physical responses or behaviors. For example, attempts to create in App dot-to-dot drawings induced what is commonly described as the “Drunken Bee Dance” of Geocaching, i.e. the erratic movement of a user zigzagging an area, in an attempt to pinpoint Ground Zero (the Geocache center). Such distinct and specific behavioral responses reinforce Susan Kozel’s argument that “All our devices invite a set of physical gestures [...] The mobile phone is a vibrant example [...] Qualities of performance – ephemerality, expressivity, humor, poetry, physicality – integrated into the design and use of wearable devices can act to disrupt, to delight and to challenge conventional uses of devices.” [5] The two weeks concluded with a public information day, presenting the many digital drawings created as

a visual display within the project space and a scheduled GPS walk around the forest of Forth Valley Royal Hospital for the general public, led by Abrupt Encounters participants.



Fig. 4. *Mapping & Tracking* dot to do GPS drawing, 2013, Abrupt Encounters, locative media © Emma Bowen.

In conclusion, none of the participants had been smartphone users at the outset of the project and this did present some challenges operationally, largely around the initiation of the technology, which as a result was undertaken by Beverley Hood and Artlink staff. Despite this there was evidence that the participants invested in the project, at times displaying frustration at technical problems but also demonstrating personal ownership of drawings and active control of development, such as invention of new methods of engagement with technology and games. The permeable, hybrid space between physical and virtual space created using these Apps did appear to reinforce the cartographic and locative system, but this overlapping space can also be disorientating, almost literally tripping the user up, particularly those who have spatial awareness problems.

SPATIAL MEMORIES

Spatial Memories was a Proof of Concept App and Authoring Tool that was developed during the period from February to July 2014, funded by the Jisc TechDis, Small Business Research Initiative program 'Good to Go,' which aims to increase independence for technology users with disabilities, in unfamiliar or challenging environments. The project was developed as a follow on to the *Mapping & Tracking* project, bringing together the previous partners from Artlink Central (Sharon Quigley and Emma Bowen), members of the Abrupt Encounters group and staff from Edinburgh College of Art (Beverley Hood), this time in combination with engineers from Geospatial and data services company, Edina (<http://edina.ac.uk/>), the developers of the *FieldTrip GB* app. The aim was to expand upon the GPS locative drawing process of the *Mapping & Tracking* project, into a more spatially complex approach, combining GPS tracking with geofenced data collection and collation and to examine the exciting basemap.

The *Spatial Memories* App enables users to create GPS tracks, with images, audio and text "Digital Memories" that are geofenced at specific GPS locations. These geofences alert the user (using a proximity trigger) when the journey is retraced. In practical terms, the previously created image, text or audio 'Digital Memory' is triggered and displayed or played when the user enters the vicinity of the GPS location, where they were made. It's a simple way to create visual, textual or audio landmarks, reference points and routes that are meaningful, based on the ground truth rather than online mapping databases and routing algorithms.

The framework for the *Spatial Memories* project was based on Edina's "Fieldtrip Open" (<https://github.com/edina/fieldtrip-open>) architecture which already incorporated many of the essential components, such as Camera, Audio, Geo-positioning and geofencing and provided a flexible framework for the additional functionality needed for the *Spatial Memories* project. A significant element of this adaptation process involved stripping away layers of the FieldTrip interface, to design more accessible and simplified, user experience.



Fig. 5. *Spatial Memories* App, 2014, Edina, interface screengrab, © Edina.

There are many Apps with similar features (BlindSquare, MyTracks, Sandero GPS, Google Keep to name just a few), but what is distinctive about the *Spatial Memories* App is the ability to organize these Digital Memories into a spatial narrative, a track which you can replay, adapt and share. Importantly, this is not just about checking into a known place, as in the FourSquare premise, but creating your own places, an idiosyncratic spatial footprint of your own making. In April 2014 we held a three day participatory design workshop at the University of Stirling, bringing together the different partners to evaluate an early baseline version of the App, generate lots of information on usability issues and ideas for subsequent development. During the workshop we also worked

with participants on a number of activities to evaluate map styles and cartographic design and symbols, to potentially incorporate alternative basemaps into the *Spatial Memories* App.



Fig. 6. *Spatial Memories* workshop walk, 2014, digital photography © Emma Bowen.



Fig. 7. *Spatial Memories* workshop walk, 2014, digital photography © Emma Bowen.

Spatial Memories uses the Open Layers Javascript library (<http://openlayers.org/>) to display maps, map controls and gestures (panning and zooming), mostly using the public *Open Street Map* server for evaluation of the App. In preparation for the April workshop, some custom styled maps were created of the University of Stirling campus location combining data from Open Street Map and Ordnance Survey (Open data). The intention was to create several versions of the same map using different layers, features and styles and use these maps in the workshop design sessions, in order to evaluate whether different cartographic styles might suit some users more than others.

We had envisaged that some users might prefer different cartographic options and map styles, in part because the *Mapping & Tracking* project had highlighted some cartographic naivety in the user group, but our design sessions suggested the contrary. Users did not have strong individual or disability driven preferences for map styles and these styles did not appear to enhance or negatively affect legibility or comprehension in any significant way. Within this enquiry we also evaluated the potential to use photos

that participants had captured as bespoke map symbols. Although the notion of turning a photo or “sketchified” image (created via existing App’s such as “Roid” App’s “Sketch Guru”) into a user generated map symbol is potentially a rich visual research topic, we found that in practical terms, bringing together multiple users content, meant that the map quickly became too crowded and was confusing in its aesthetic diversity, in comparison to the holistically pre-designed map symbols.



Fig. 8. *Spatial Memories* basemaps, 2014, Edina, screengrabs, © Edina.



Fig. 9. *Spatial Memories* user generated map symbol workshop, 2014, digital photography © Emma Bowen.

Following participatory design workshops in April there were some changes to our evaluation and development plan. One of the main technical enhancements to the *Spatial Memories* App interface following the workshop in April, was to make the GPS track the central design concept, ensuring each Memory is associated with a single track. On a workshop level, follow up sessions with three members of the Abrupt Encounters group (selected as a range of users with a broad spectrum of ability) were organized for June 2014. One of the main obstacles identified in the April workshops was the fact that only one of these users owned or used smartphones themselves. So in an attempt to address this, as part of the follow up sessions the three participants were given devices to take home and use freely for a period of ten days. Midway through this period, the development group (always with at least one engineer and one creative) accompanied the three users on an individual journey, which had some personal relevance, in an attempt to gain insight into how these users might utilize the *Spatial Memories* App in their everyday settings and locations. We encountered a variety of usability issues throughout the project. These included simple technological challenges such as intensive battery consumption, through the screen brightness and non-energy saving set-up requirements for the specific user group. Several users had problems with touchscreen gestures, often depressing a button for 1 second or more. For example, the current interface listens to Javascript on Click events which only fire if the press is less than 500ms-1000ms. The workflow of the default Cordova camera App, was problematic for some users, in particular the confirming process of whether to “Use” or “Retake” the photo was often misinterpreted and front facing camera mode mistakenly switched. As a result, the *Spatial Memories* engineers implemented a much simpler, revised Camera App.

In retrospect, in order to address some of these more operational issues, it would have been useful to provide the Abrupt Encounters group with Smartphones from the earliest stages of the project, providing training in general Smartphone usage for several months, so that a smartphones became part of their everyday life, ahead of running evaluations of the prototype. We found working with users who are not using smartphone technology in their daily lives was not conducive to evaluating the usefulness of the concept. This

may require fostering long term relationships with user groups in the future, that span multiple projects and software evaluations.

One of the biggest challenges the *Spatial Memories* project faced was the difficulty to evaluate unfinished, buggy software with end users who already face a number of challenges interacting with smartphone interfaces due to their disabilities. Users tended to place blame for things not working properly on themselves rather than lay blame on the incompleteness or poor design of early software iterations. There appears to be a tension between a rapid proto-typing methodology, with a short, iterative versioning approach and developing assistive technology, which requires consistently high quality, un-buggy software, which will actually be useable by someone with disabilities. As a result of interaction with Abrupt Encounters group in this project, the *Spatial Memories* designers and engineers have a far better understanding of how disabilities such as memory and focus issues, fine motor co-ordination and visual impairment can create problems for users interacting with Smartphone interfaces.



Fig. 10. *Spatial Memories* individual walk, 2014, digital photography © Emma Bowen.

Potential uses of the *Spatial Memories* App are multiple and varied. Some users in the group utilized it as a creative tool, others a bespoke narrative journey, as a system of geospatial reminders i.e. what to look out for, what you need to do next or just to get your bearings. For some, such as autistic users who are not verbally articulate but are at the same time are technically capable, such as Gus, a 13 year old Autistic boy with a profound complex, assistive relationship with “Siri,” The *Spatial Memories* App provides the potential to demonstrate, explain and engage with personally relevant routes and places. [6] The *Spatial Memories* App’s uniqueness is in organizing your memories into a spatial narrative, a track which you can replay and revisit.

LINKLOCAL

LinkLocal is a collaborative community smart phone app which is an outcome of a UK Research Council project: *Communities within Spaces of Flows* (Flows). The project follows on from a locative media platform developed through the *Sixth Sense Transport* project, also funded through UK research councils. The Flows project that took place in an urban setting draws on findings from previous trials that took place in the *Sixth Sense Transport* project which took place in rural contexts. The app aimed to facilitate collaboration and communication between users,

therefore enabling users to create/join a network which facilitates the pooling of resources. The app also enabled participants to see the collective movements of other people in their social network over time and interact with one another by sharing information and posting various requests, such as shopping, general help and lift requests. The app, as part of *Sixth Sense Transport*, was originally designed for use by a campsite community but was adapted to meet the needs of rural and then urban communities. After consultation with a local community activist, the app was rebranded to be more relevant and recognisable to the local community involved in the latest trial.



Fig. 11. Wester Hailes, Edinburgh 2014 © Chris Speed.

The context for the trial was Wester Hailes in Edinburgh which was the last major local authority housing estate constructed in the UK with the City of Edinburgh Council beginning construction on the suburban site in 1968. Since the mid-1970s the neighbourhood has undergone a vast amount of transformation driven in a large part by bottom-up community activism. All of Wester Hailes is within the bottom 15% (most deprived) of the Scottish Index of Multiple Deprivation, despite the neighbourhood receiving vast amounts of regeneration investment in the 1980s and 1990s. This regeneration led to massive physical changes in the neighbourhood, for example, 18 blocks of high-rise flats, 1600 homes in total, being demolished. However social challenges around community development remain in terms of engaging residents with their community and neighbourhood (bridging social capital). The LinkLocal trial set out to explore two primary issues for the community:

- To better understand how locative media apps may be deployed into community support networks to improve quality of life and enhance well-being.
- To analyse ways in which social network technology can bring about new place related affordances for communities and unlock community potential to achieve well-being gains.

Based upon these aims, the trial had the following objectives:

- To provide participants with a means to visualise the community's travel patterns
- To provide a platform in which users could communicate and share local information

- To examine the ways in which participants communicate with each other
- To explore the potential for collaboration amongst a community of users

Eleven participants were recruited through the West Edinburgh Time Bank. Members were contacted by Time Bank facilitators and invited to be involved in the app trial. They attended a meeting where they were given further information about the project and a demonstration of the mobile phone app. Four participants were recruited after the meeting took place and were provided with the same information on a one-to-one basis. Participants were either loaned iPhones (n=9) for the duration of the trial or had the app installed on their own phone (n=2). During the trial, one participant required further assistance on how to use the app. The trial took place over approximately 7 weeks during, April and May 2014. A focus group was held after 5 weeks and 5 participants were interviewed at the end of the trial.

Participants reflected a range of ages from mid 30's to 70's and contrary to previous trials, car users were in the minority (n=1). Not all participants were known to each other but all were known to the Time Bank. One of the most active users was someone who had initially struggled with the technology but persevered because of the desire to help others through the app. This person was also one of the older users, however, we have found that age is not a factor when considering engaging with the technology or the app. The app works by allowing members to post requests for help at specific GPS locations using a map on the iPhone. These requests are then shared with all users and it is hoped that at least one member will accept the offer to help and then contact the person who posted the message. In addition to messages posted by members of the community the Time bank facilitators also posted messages to promote the use of the application.

It was evident in all of the interviews, aside from the interview with the Time Bank facilitator, that all participants saw themselves as 'helpers' rather than in need of help: "There wasn't really anything that I needed anybody to do for me. I have a car and it was more if I could do anything for other people." (Margaret)

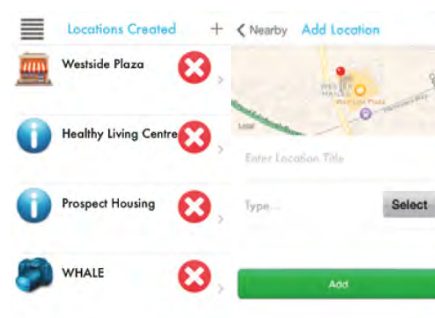


Fig. 12. Adding locations in LinkLocal to which messages can be attached. © Sixth Sense Transport.

They frequently spoke of how they could help others. This is consistent with other trials and is partially an outcome of trial volunteers demonstrating a predisposition to help others. However, as users were recruited through a Time Bank group it was thought that they would be open to the idea of not only offering help but would also be comfortable with receiving help.

EXAMPLES OF SHARING: LIFT SHARING

One example of lift sharing took place. This was following a message offering a lift to one specific individual. This was unusual as in previous trials offers of lifts were posted for the whole community to potentially take advantage of. The user who posted this message actually spoke of understanding the needs of other users to be able to help them: “I don’t really know G or R so I don’t know what I could offer them.” (Margaret)

Most participants did not drive or have access to a car but did not see the need to ask for a lift. They adapted their help offers accordingly: “Well I can’t drive so I’d rather do a bit of shopping for other people. Well my mum and dad take me shopping on a Saturday to Morrisons in the evening, so if Gary or anyone needs anything, going in my dad’s car I manage it.” (Robert)

This pattern was evident in non-car users in previous trials. In addition, previous trials revealed concerns about indebtedness as a constraint to access lifts: “it’s not like I could repay the favour.” (Elaine)

Location related transport exclusion is a significant problem. Even where app users can visualise other users making trips with spare seats, the norm to reciprocate presents a barrier to accessing this spare mobile resource.

EXAMPLE OF SHARING: INFORMATION SHARING

Two Time Bank facilitators took part in the trial and posted messages sharing information about TimeBank events: “Drop in Monday 14th April – Drop in Mon 14th April is a visit from the local food bank and fixing dates for social activities - hope to see you then.” (Mary)

One facilitator thought the app was a good way of keeping in touch with Time Bank members. She stated that she would be very happy to continue using the app as part of the day to day running of the Time Bank and had considered various scenarios associated with its use: “We [the Time Bank] would use it I think if enough people had smartphones [...] as long as we made sure that information was getting to those who didn’t have smartphones it would be fine.” (Mary)

Other users liked the idea of the app being used to share information about local events or other items of interest locally: “If everybody had that wee app, they’ve all got it on their phone, you could just send out a quick message saying we’ve got this event it’s going to kick off here and get some people along.” (Daniel)

One user used the app to let other participants know about a Steam Train that would be passing through the community. This demonstrates the value in sharing information spatially and temporarily relevant information, it was a last minute event and he was able to get information out quickly and without cost to what could have been a wide audience. “Steam Train – coming through WH, approx. soon.” (Daniel)

Two users pointed out that it would be useful to deploy the app across the whole of the Health Agency. This would help share information between groups and might aid unity: “I do see it as an agency-wide collaboration that would be useful.” (Mary)

“I can see it working for somebody like the health agency, not just the time bank, but we in the health agency we could communicate, you know we are involved in edible estates and the whale arts people we are involved with a lot of different organisations in this area and it would be a handy way to get them involved in it, you know sharing information and just look what’s going on here or something’s come up there, anybody interested in coming along? Because not everybody’s got access to their emails but if somebody had that wee app, they’ve all got it in their phone you could just send a quick message you know this is the event, its gonna kick off here and get some people along, if they want to come along or whatever.” (Daniel)

Requests for help mainly came from Time Bank facilitators, however, there was one example of a request being placed by another user: “I have couple tonnes of compost for the raised beds we built last week. Needs moving from front garden to back garden. It needs to be transported through the house if anyone about today feels fit enough to help out give me a message for details.” (Daniel) Unfortunately the request was not accepted by anybody.

REFLECTIONS

The LinkLocal project was particularly interested in combining messaging with temporal and spatial data across a group of active participants to support collaborative practices. To do this messages were associated with locative data (recording of longitudinal and latitudinal points with time stamps) and shared with others in the study. The project was interested in how this sharing of data could lead to social connections and through requests for help could inspire to reciprocity [8]. The enquiry focussed upon two primary outcomes of the study: the adoption of lift sharing and the sharing of information across the network. The user group involved in the study was diverse – some with cars, some without and some in good contact with members, others who didn’t know fellow members. These characteristics inhibited the app from facilitating any significant material sharing. The findings suggest that the participants used to app to manage through their existing bonding capital by using the app to communicate and share stories, but struggled to use the bridging capital made available through app to give or receive material help. Lampinen et al, point to the feelings of indebtedness that

members of networks can feel as they enter online exchanges and how this sense of debt can contribute to a resistance to forms of sharing. [9]

Using locative data to constitute platforms like LinkLocal evidently isn't enough, there are significant social and personal issues involved in the development of reciprocity. The interviews suggest that participants struggle to grapple with the nature of receiving and asking for help across a digital network. Happy to share information about the area and keen to help, an exchange network never really began because few people would use the system to ask for help. Future iterations of the application should better understand how to capitalize on the lopsided resource of having too many helpers and not enough people in need of help.

Whilst the application uses data in the form of a heatmap to visualize where people have been in the network, perhaps the visualization of successful exchanges would inspire more 'helpers' to help as the exchanges would appear as rewards. However it is the lack of jobs to help that is the more significant problem and in future studies the team could consider incentivizing champions that can ask for help in order to kick-start an exchange platform.

CONCLUSION

"In one way or another, all [digital art works and environments] are concerned with possible relationships between the physical space and the virtual and what distinguishes them are the balance between these two realms and the methods employed to translate one space into the other. Some artworks try to translate qualities of the virtual world into the physical environment, others strive to map the physical into the virtual; and yet others are aimed at fusing the two spaces." [7]

The three GPS platforms used as case studies in this paper provide insight into how different community groups are beginning to develop their own mapping databases. The unique nature of each of the smartphone apps was to discover what form of practice would benefit each user group. The *Mapping & Tracking* project demonstrated how a bespoke use of an application can offer the personal ownership of drawings and an active control of development, such as invention of new methods of engagement with technology and games. The *Spatial Memories* platform allowed participants to take ownership of their landscape through the generation of geo fences that were correlated with personal stories and media.

The LinkLocal app set out to use a spatial logistics platform for residents in a deprived area of Edinburgh to ask and offer help. All three case studies, despite being limited interventions, establish precedents for the ways in which communities and specific user groups can begin to develop their own spatial databases. Counter to the dominance of FourSquare as the primary database for social coordinates that now informs third

party applications such as Apple Maps, the projects presented in this paper have targeted groups to empower them to inspire them in the production of their own geo-spatial datasets.

The projects present a range of opportunities and barriers through their use. Whilst being very engaging in the development of personal data sets and documents of personal geographies, social conventions persist that inhibit the use of data sets to empower groups and individuals.

As the static map as a document or contract of power across space gives way to the database, artists and designers should work hard to develop strategies to empower the individual and group to realize the value of their data. Moving from the passive voice of being a mark on somebody else's map to realising that we are the map is a cultural challenge in which we need to learn how to exercise that power. A power that could invert the representation of space, time and people forever.

ACKNOWLEDGEMENTS

We would like to thank all the participants who took part in the projects and trials for their enthusiastic involvement in the project. *Mapping & Tracking* and *Spatial Memories*: Forth Valley Royal Hospital, Larbert, Abrupt Encounters, Artlink Central and EDINA; LinkLocal: the Wester Hailes Health Agency and the West Edinburgh Time Bank.

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OBSERVATION INSTRUMENTS FOR IMAGINARY GEOGRAPHIES

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ABSTRACT

Observation Instruments is the title of a series of interactive time-lapsed video installations that investigate our perception and re-imagination of Canada's Northern landscape. The work is derived from a database containing images captured by a found webcam located in Kimmirut, Nunavut, as well as weather statistics. Started on June 21st, 2010 (the longest day of the year) the database, which grows according to an automated process developed by the author, now contains over 150,000 images. The installation consists of time-lapsed projections of this image archive, in which the visual compositions can be filtered and altered according to time, weather data or geometric parameters accessible via tangible electronic control panels (the instruments). These devices provide the viewer an opportunity to examine, contemplate and re-imagine the Northern landscape, taking them on a virtual journey to a distant and unfamiliar place. Through the multiplicity of a single image, the viewer is given a narrow perspective on this remote land, while at the same time exposed to a variety of ways of seeing.

BACKGROUND

Before diving into a discussion of the project itself, a bit of background story is necessary. The works described in this paper first started taking shape in the context of a working group created amongst colleagues and centered on developing a project using the theme of light as a point of departure. More specifically, we became interested in the idea of northern light – the Aurora Borealis comes to mind, of course, but also simply the daylight itself, which takes on unique qualities when one is located far enough north, particularly during the long summer days.

While we, Canadians, pride ourselves to be a Northern people, we mostly live huddled along our southern border and as a result not quite North enough to experience the light we were looking for. Thus, we turned our attention to online webcams, performing a kind of virtual tourism (and avoiding rather extensive travels in the process). [1] We looked at dozens webcams located in the northern reaches of the hemisphere for inspiration. One in particular, discovered serendipitously by my colleague Pierre Tremblay, caught our attention.

Hosted at kimmirutweather.com, the webcam frames a street in the small village of Kimmirut, Nunavut, with the Hudson Strait and mountains as backdrop. The scene is picturesque, reminiscent of the long tradition of Canadian landscape painting. It is possibly accidentally framed that way, but the resulting composition is nonetheless rather compelling. The website itself appears to be run by a local resident and provides a plethora of regional weather conditions data, a primary concern in this part of the world where roads connecting villages are scarce, sometimes non-existent and often only way in or out is by plane or boat.

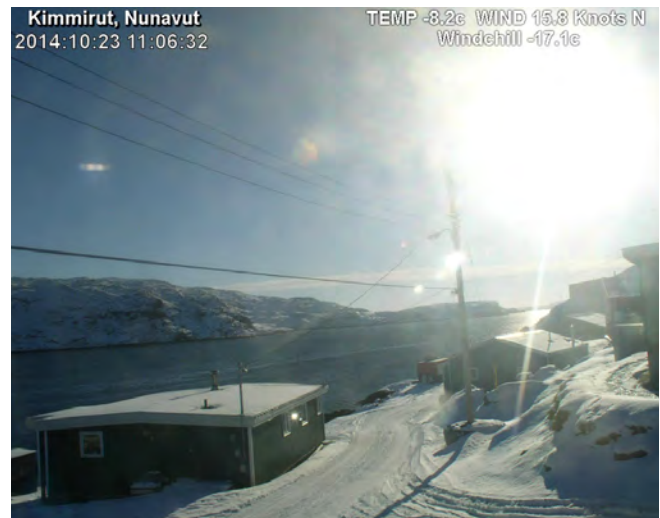


Fig. 1. The webcam image (hosted by kimmirutweather.com).

THE DATABASE

The webcam image became somewhat of an obsession. Seeking exemplary displays of the northern lighting, we started to tune in at all hours of the day. While the image only updates every 15 minutes, over time, many small details begin to emerge: a small window on a house, opening and closing throughout the day; a car, vanishing down the street; a boy riding his bike; a silhouette's shadow, lurking into the frame; a boat coming into the harbor; the tide, dramatically rising and falling (nearby Ungava Bay has the second highest tides in the world). An imaginary narrative begins to unfold from these seemingly insignificant occurrences, a fictional rendition of the place, experienced through the narrow lens of the webcam.

At first, small discoveries made by observing the webcam were collected haphazardly using manual screenshots and annotations. The process quickly became impractical and as a New Media practitioner working primarily with computation, I became intrigued with the possibility of capturing every moment available. A program was written to scrape the webcam image and archive it in a database, alongside the detailed weather data that was available on the site at the time and as well as image metrics such as brightness and color descriptors. The automated script was launched on June 21st, the summer solstice and longest day of the year and has been archiving images and data ever since. As of writing, the database contains over 150,000 entries. The works presented in this paper examines the role of the webcam as an unbiased and unrelenting image collector, unimpeded by aesthetic judgment, as well as the use of natural data to define structure in time-based media. On some level, the data itself could be interpreted as a continuation of the idea of *found object* as developed by Marcel Duchamp amongst others.



Fig. 2. *Constructed Land* exhibition, photograph by Brenda Liu.

CONSTRUCTED LAND

The image database became the focal point for an multi-format exhibition entitled *Constructed Land*, featuring works of the collective Pierre Tremblay, David Bouchard, Bruno Lessard and Alex Geddie. Each artwork in the exhibition proposed various experiences of reading this database. The Kimmirut scene remained a constant throughout each piece, but it was transformed, re-imagined and presented under a different light by each artist's process. My contribution to the exhibition consisted of a pair of time-lapse interactive video works entitled *Observation Instruments*, as well as a series of time-lapsed prints.

Observation Instruments

The Instruments were designed to provide the user with an opportunity to experience the image data in its entirety, while given the tools to re-imagine the remote site and shape their own narratives. The work aims to echo my own process of exploration and discovery of the location. Each Instrument consists of a video projection and a podium with a custom electronic interface placed atop. Using the analog knobs and switches on the interface, users can control video projection in real-time.



Fig. 3. *Observation Instrument #1*, podium detail, photograph by Brenda Liu.

The first Instrument generates a time-lapse centered around observing a specific time of day, showing the light, motion and events at that moment varies through the weeks, months and even seasons. The projected image is built of strips sampled from consecutive images pulled from the database at the time dialed in by the user using the Time knob. An LCD display shows the time selected, as well as the date of the currently being image sampled. Knobs controlling the Width of each strip (effectively controlling the time spent on each day) and the sample offset Position are provided for additional control. A Repeat switch toggles between sweep across the images or repeating the same section each day. A white line moves across the projection from left to right as the image constantly rebuilds itself according to the parameters entered by the user.



Fig. 4. *Observation Instrument #2*, podium detail, photograph by Brenda Liu.

The second Instrument explores combining and manipulating multiple times within the same frame. Successive images in time are combined in a concentric pattern and customizable using two analog joysticks on the podium which allows for geometric configurations ranging from the full image to rows, columns or a grid of varying dimensions. Other controls include a filter for the image selection according to the temperature at the time of capture, a dial to change the speed of the time-lapse and a switch which triggers different grid layout methods, such as mirrored or repeated portions of the original image. Like in the first Instrument, an LCD displays the date and time of the center image.

In both projections, the unrelenting progress of time is completely out of the user's control. The software moves forward in time through the database, cycling back to the beginning when images run out in an infinite cycle, with no option to pause. As a such, the images on the walls are the product of both the current position within the overall time-lapse as well as the particular combination of controls determined by the user at that point in time. The resulting compositions are highly unpredictable, almost generative in nature, producing fleeting displays of beauty that can only be experienced being in the room, at the specific moment. In addition, the Instrument projections are accompanied by a multi-channel generative soundscape work by Alex Geddie.

Each podium broadcasts weather information as it pulls images from the database, mapping the data to parameters in the sound engine. The result is a subtle, but audible change in the room's atmosphere, creating a links between the visuals unfolding on the walls and the ambient sound.

The types of controls given to the viewer over each projection enable a variety of compositions ranging along an axis from the representational (i.e. a movie-like time-lapse) to the abstract where the original location is almost unrecognizable. These viewer-defined compositions also set the stage in a different way each time for subsequent visitors, as the podiums are discovered in the state left by the previous users.

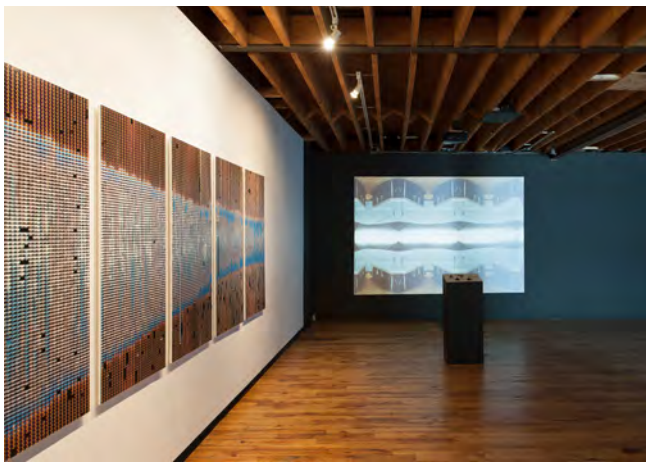


Fig. 5. *Observation Instrument*, exhibition view, photograph by Brenda Liu.



Fig. 6. *One Year in Kimmirut*, photograph by Brenda Liu.

ONE YEAR IN KIMMIRUT

As a companion piece to the Instruments, a series of prints was also produced to visualize one year of daily webcam images, archived at a 15 minutes interval during 2011. A time-lapse of sorts as well, the prints are reminiscent of the photographic works of Eadward Muybridge. [2] Rather than illustrating movement, however, the image grid aims to illustrate the passage of time. Each panel in the series represents one month of the year, from

January to December. Each column of images represents a single day. The resulting shape is the product of the amount of daylight through the year that is unique to that particular location. Seen from afar, the panels evoke a landscape; one can imagine a mountain range, reflected in a lake, much like the one seen in the original image. Up close, however, at about 1 inch wide each, the individual frames become recognizable and take the focus, allowing for a methodical observation of the everyday life details throughout the year at that location.

RELATED WORK

The inspiration for this work comes from a rich history of works using time-lapsed video. Recent experiments such as *Teehan + Lax Lab's Hyperlapse* experiment, have shown the ongoing relevance and potential of the technique. [3] Also, for reference, Golan Levin maintains a very comprehensive list of innovative projects in their approach to time lapse and temporal video recombination. [4] However, two contemporary works stand out as having particularly influenced my process and acted as points of departure for the work described in this paper.

The first is a piece entitled *Machine for Taking Time* by the Canadian new media artist David Rokeby. [5] Several works by Rokeby involve time-lapse and visual compositions combining images in the space/time domain. However, this work deals more specifically with the themes of the archive and light. In *Machine for Taking Time*, a surveillance camera mounted on a motorized mechanism takes pictures of the space outside of the gallery and archives them in a database. During the day, a software program wanders through this archive, selecting images algorithmically, maintaining the continuity of slow camera movements but leaping randomly in time and creating a play of contrasts where time passes both quickly and very slowly.

The second work is the *Khronos Projector* by Alvaros Casselini, developed at the University of Tokyo. [6] This is an interactive installation in which the pre-recorded video content can be viewed in a completely new way. Besides the traditional time controls such as start, stop, forward, backward and shifting of the video, the *Khronos Projector* allows the user to send parts of the image forward or backward in time by touching the projection surface, creating an untying of space and time. The result is similar to a sculpture through which the user can manipulate and experience the substance of space and time with their own hands.

CONCLUSION

The remote location revealed via the Observation Instruments paint a picture of isolation; yet it provides a sense of connectedness via the narrow lens of the webcam. In *Reconstructions and Digital Landscapes*, an essay about the *Constructed Land* exhibition, Steven Loft writes: "The continuity of imagery in all the works acts as a channel of communication, a conduit to the remoteness of Kimmirut. The artists bridge this conceptual and physical gap by creating complex information systems woven into the fabric of

place and time, of past and present. It is a sublimation of time encapsulating concepts of home, landscape and climate through the bridge of electronic communication. Like messages sent to or from space, the originating images gives a glimpse, a snapshot to be interpreted and translated through the eyes and lens of the artist and then the viewer." [7]

As such, the works discussed in this paper proposed a mediated experience of a locale from the constrained lens and perspective of a distant outsider. Evoking notions of solitude and encroachment, the fragility of "settlement" and the powerful forces of nature, the work introduces us to a region of the country few of us have ever experienced. The North or at least the Idea of it as developed by Canadian writer and composer Glenn Gould in his *Solitude Trilogy*, is indeed a "convenient place to dream about." [8] The *Observation Instrument* series provide viewers with the means engage with to this utopian notion of the North, generating landscapes which lies in between real and imagined territory.

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(+/-) PENDULUM: LOCATION IN THE INFORMATION AGE

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ABSTRACT

The embodiment of physicality amidst digital noise has the potential to artificially harmonize notions of humanity. With society operating both digitally and physically, how do we make sense of an environment that is partially synthetic? (+/-) *Pendulum* operates using the mechanics of the *Foucault Pendulum* (a mechanism created to demonstrate the Earth's physical properties); however, intangible outlets (a smartphone and web application) inform its location based on participatory user input. Physicality has been not only democratized but thwarted – now malleable to the masses.

INTRODUCTION

History is inundated with revolution. Not only politically, socially and economically, but also technologically. Humanity is in constant flux and as a result, industries develop, advance and adapt to bend to our needs. The Industrial Revolution and the Digital Revolution (or Information Revolution) are two prominent technological movements that have greatly impacted daily life. As a result of advancements and experiments set forth throughout each, the way we operate as humans and the lens in which we view the world has and will continue to change.

The Industrial Revolution served as a pivotal period in the advancement of humanity in its major industrial sectors. Although originating in Britain, it caused a profound domino effect throughout the rest of the world. Its impact paved the way for mass production, lowered cost of goods, urbanization, increased demand for raw materials and trade. These advancements allowed for the Second Industrial Revolution (dated to the latter half of the 19th Century), which brought forth a slew of inventions including the telegraph & Morse code, telephone and light bulb. [1] The Industrial Revolution propelled technological and scientific experimentation forward in a way that enabled society to think and communicate differently.

Moving forward, the Digital Revolution caused yet another drastic shift. The world now moved from its traditional manufacturing processes to ones powered by computing and new media. Researchers claim that the current economic climate is one driven by data. Data has even been equated to the “new oil,” since its prevalence can help us refine our information in order to draw valuable conclusions. [2] Although the Industrial Revolution paved the way for the Digital Revolution, when taken out of chronological context, the two can almost be seen as contrary forces—one focused on the development and dissemination of analog technology and its outlets, while the other focused on the scalability of computation. On the other hand, when viewed chronologically, the separation between the two revolutions is far from discrete. This paper seeks to reflect on the malleable intersection of our physical and digital lives by way of the author's installation (+/-)

Pendulum. By extending upon the basic principles of the *Foucault Pendulum* (an experiment which concretized the Earth's physical properties), (+/-) *Pendulum* sheds light on the diaphanous divide that currently separates our physical and digital selves.

THE FOUCAULT PENDULUM

The 19th century presented itself with a series of novel developments in industrialization. Towards the latter half of the century, the Industrial Revolution occurring in Western Europe was beginning to spread globally. The world seemed largely concerned with the design and fabrication of useful industrial machinery and how to improve the physical world. Scientists, theorists and academics focused on uncovering the inner-workings of the world and how its materiality informed technological advancements relevant to the Industrial Revolution.

Around this time, experimental French physicist Jean Bernard Léon Foucault spent much of his career studying worldly materials in relation to celestial bodies. In 1850, he discovered that light travelled faster in air than in water, which debunked both Newton's and Descartes' corpuscular theory of light. While using a metal lathe to create a conical pendulum for a clock that would keep a telescope focused for long exposures, Foucault accidentally bumped the rod and caused it to vibrate. In the process, the rod maintained its plane of vibration even when rotated. This observation served as the foundation for the *Foucault Pendulum*, which he created on January 8, 1851. [3] Foucault successfully vibrated a pendulum two meters in length that maintained position while the floor moved in tandem with the Earth's rotation. The pendulum itself oscillated independently of the Earth's rotation based on the pull of gravity and the tension of its wire.

(+/-) PENDULUM: FUNCTIONAL DESCRIPTION

Recent contemporary artwork has exemplified the aesthetic possibilities of manipulating and incorporating preexisting data sets in both digital and post-digital ways. These data-driven works have set a precedent for novel ways to not only manipulate data but also create it in real-time. With mobile computing and robotics, it is now possible to incorporate aspects of content-creation and data in the mechanics of kinetic sculptures and installations driven by participatory smartphone applications. (+/-) *Pendulum* utilizes data to add a collaborative and participatory element to kinetic objects in order to explore dualities ranging from individual/society and analog/digital.

(+/-) *Pendulum* is a participatory installation created so that its internal driving mechanism is based on participatory data (Fig. 1). Its intent is to serve as a starting point for the creation and collection of participant data. The work is meant to serve as a microcosm of the intersection of our digital and physical selves.

As previously mentioned, the basis of the installation is founded on the mechanics of the *Foucault Pendulum*. However, unlike a conventional pendulum, the arm of the installation operates horizontally using the same physical properties as if gravity is still impacting it. The conceptual basis of the work is to reflect on the intersection of our digital lives with our physical lives. The *Foucault Pendulum* was created in the mid-19th Century to exemplify the Earth's physical properties (i.e., the fact that it is round and rotates). [4] Many may prescribe to the idea that we now live in an era where the Earth's physical properties are of little importance. As a result, the rotation of the *(+/-) Pendulum* is based on participatory user input from a smartphone application, which asks the question "Where do you want to be?" From collective user input, the average of all data points orients the pendulum to a collective desired location, which seeks to show that our world is not flat, round or oblong—it is malleable and democratic in the digital sphere.

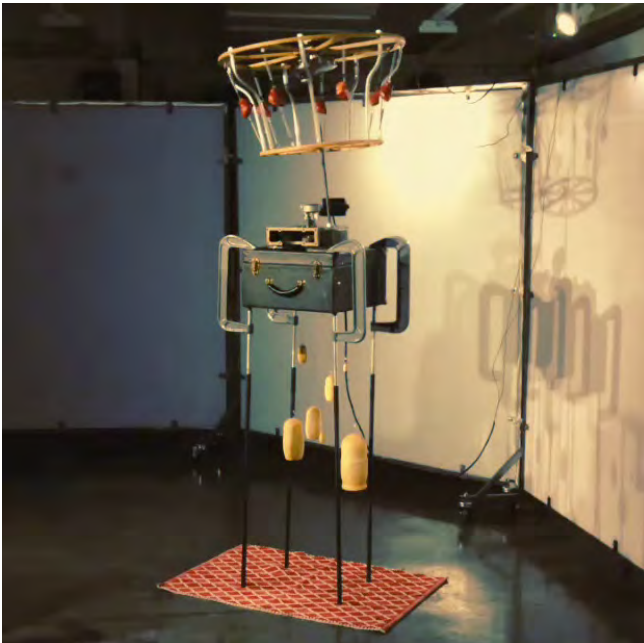


Fig. 1. *(+/-) Pendulum*, 2014, Sculpture, Raphael Arar.

The responsive web application (Fig. 2) component provides a minimal user interface prompting the user for a desired location in the world. Upon entry, the user is shown the current physical location and asked for a desired location anywhere in the world. The user experience is straightforward in that the only option is to submit an entry into the system. After a successful submission, the user is shown not only where the submission lies on a global map, but also the new location of the pendulum, which is collected as a running average of all data points (i.e., latitude and longitude values). The user then has the option to view all collected data points visualized on a map by way of a system that polls a remote web server and runs a query in order to display entries. This screen also provides the user with the ability to understand more of the concept behind the work and its inspiration.



Fig. 2. *(+/-) Pendulum*, 2014, Web Interface, Raphael Arar.

(+/-) Pendulum has a two-fold interaction model: the sculptural aspect serves as springboard for content creation from participants, while the digital interface serves as a media container to view and interact with all data points. The sculpture thus serves as a tacit form of interaction, while the web interface is a more explicit dialog with a user. Ultimately, a triangular interaction model arises among the user, physical object and digital interface. The 21st Century is the era of big data. Undoubtedly, the implications of mass amounts of data affect the daily lives of individuals. Not only does the digital realm provide more choice, but it also increases the amount of information. *(+/-) Pendulum* incorporates data granularly and also allows for its creation by optionally asking users to contribute. In doing so, three themes of heart, harmony and noise weave their way into *(+/-) Pendulum*, as described in the following section.

THEMATIC SYMBOLISM WITHIN *(+/-) PENDULUM*

Various thematic elements pervade the work presented within this paper. Three in particular are recurring: anatomical hearts, harmony and noise. These subthemes act as unifying elements of *(+/-) Pendulum*, each one representing dualities including analog/digital, nostalgia/novelty, physical/metaphysical and self/society.

Heart

The anatomical heart is a symbol imbued with multiple meanings. How does a heart represent humanity and how does this symbol evolve as it relates to aspects of semiotics and people? The author carries the symbolic aspect of the anatomical human heart throughout the piece in order to represent individuals as members of society. The heart, taken out of context of the human body, is mostly seen in medical and entertainment contexts (i.e., horror

films and special effects). However, historically the heart has represented a variety of emotions, particularly the duality of both pain and pleasure, especially as it exists in film and literature. In fact, many aphorisms, idioms and phrases revolve around the heart as an organ that embodies emotion. [5] In *(+/-) Pendulum*, the heart serves as an emblem of an individual, abstracted as part of a larger working system. The metaphor with the heart is more literal, but extends upon the idea that humans are pieces in a greater, moving entity and that movement is cyclical, largely out of the control of any single person. This is reflected in the collaborative nature of the position of the work. Although many users are contributing independently, their resulting input is being collected and averaged in a democratic fashion.

Harmony

How does inner reflection and spiritualism evolve when technology, particularly computation, demands more of the self? This question is a recurring thematic element of *(+/-) Pendulum* and an integral aspect of the author's thought process. The work at hand explores the duality between ancient and futuristic symbolism and the perceived intersection of the two. With the exponential developments of computation, partially explained by Moore's Law, human beings can now offload more of the mundane, simplistic tasks (e.g., budgeting, planning, etc.) as well as the complex processes (e.g., data analytics, biological tests, forecasting, etc.) to machines. By transferring these processes to machines, humans can theoretically be cleared of tasks that affect stress levels and mood. The question then lies: how does progress affect aspects of inner peace? Are humans more stable or volatile by way of these advancements? The author's interest in these questions relating to intrapersonal interaction serves as a driving mechanism in the creation of *(+/-) Pendulum*.

To be more explicit, the theme harmony manifests itself in the piece sonically as well as figuratively. *(+/-) Pendulum* reflects on harmony in a variety of ways. The significance of the number seven is directly tied to the oscillating Russian nesting dolls or Matryoshka dolls. In Pagan Russian times, the typical Matryoshka doll set would include seven pieces in order to represent harmony. Since harmony was closely tied to nature, seven was found to be harmonious in natural phenomena and particularly the seven colors of the rainbow. The symbolic ties to seven and harmony appear in other sources as well, such as seven days in a week, seven notes in a typical Western music scale (i.e., C-D-E-F-G-A-B) and the Seven Sages of Greece. [6] The historic aspect of the number seven along with its modern day placement within the physical object adds interplay between past and present. The number seven extends further to provide a unifying element to the piece in its use of seven anatomical hearts that represent time values struck by the pendulum.

Noise

How does communication noise affect humans from both an intrapersonal and interpersonal standpoint? In an article entitled "A

Mathematical Theory of Communication" from 1948, Claude Shannon describes the basic elements of communication. [7] First, an information source produces a message. This message is then transmitted to create a signal that is sent through a channel, which in turn, carries the signal over to a receiver. The receiver transforms the signal back into the message intended for delivery to a destination (either a person or a machine). Shannon created a formal concept of a 'channel' as one that carries symbols and noise (Fig. 3). Both Shannon and Alan Turing point out that the number of symbols must be finite; as they proliferate they become increasingly hard to discriminate and noise blurs one into another. By dealing with an intermediary device, the opportunity for noise, obfuscation and detachment increases in this model. Whether this form of communication is interpersonal or intrapersonal, the presence of technology presents an interesting shift in our instinctual abilities to communicate – we must now adapt to our devices in order to clearly delineate our messages. The author's interest in the evolution of Shannon's original model of communication by way of computational progress exists as a pertinent theme in the conception and execution of the *(+/-) Pendulum*.

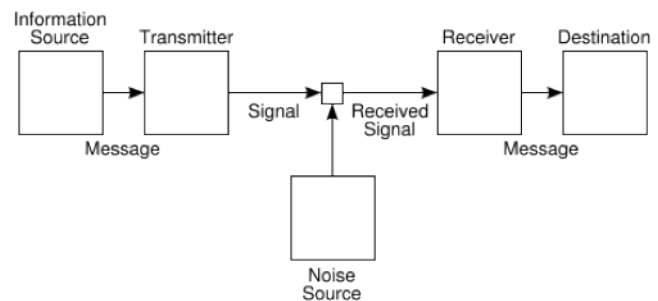


Fig. 3. Shannon's *Schematic Diagram of a General Communication System*, Wikipedia.

(+/-) Pendulum can be characterized by having a participatory interaction model. Inherent to the work is a systemic feedback loop that occurs between participants and the kinetic object. Input into a responsive web application transmits a signal to a web server, which transmits a signal to a microcontroller that ultimately drives a physical object. As a result, there are multiple communication streams operating simultaneously with a variety of users. Broken down in Shannon's Communication Model, this signal stream can be directly translated to have multiple opportunities for noise to arise. [7] Since each stream can be seen as a microcosm of technologically oriented societies, noise has the potential to be a more persistent element of daily life.

ART & DESIGN: COUNTERBALANCES

On February 3, 1851, Foucault presented his pendulum in the Meridian of the Paris Observatory. Although the rotation of the Earth was no longer in dispute, [4] his demonstration served as physical proof of its measurement. As a result, even unscientifically minded individuals were able to comprehend the physical properties of the

Earth. Shortly after a public viewing, Foucault designed and implemented a larger demonstration in the Panthéon in Paris with painstaking attention to detail and visible consideration in aesthetic execution. The Panthéon showing sparked deep interest in the pendulum's operation and this interest spread globally.

The wonder and awe caused by the experiment served as a catalyst for the popularization of a scientific community interested in the physical sciences as well as an interest in the intersection of the arts and sciences. Astronomer Benjamin A. Gould stressed that the *Foucault pendulum* was unique among physics experiments and “probably none more beautiful was ever devised; certainly few have ever attracted equal attention from all classes of scientific men and from the public.” [8] One may glean that although Foucault engrossed himself deeply in the sciences, he maintained a clear vision in balancing scientific accuracy with aesthetically-driven execution. Foucault's pendulum serves as not only the seed from which the concept behind *(+/-) Pendulum* grows, but also Foucault's Panthéon demonstration serves as inspiration for the author's artistic process by encompassing a focus on a duality between aesthetic concept and design-thinking execution.

DESIGN PRINCIPLES WITHIN ART

The author's process in creating *(+/-) Pendulum* employed the incorporation of iterative design principles within an aesthetic process. The participatory nature of the work caused the author to embark on a user-centered design approach. In doing so, various design principles have been considered. Don Norman, a cognitive scientist and engineer, has pioneered many ideas surrounding this approach. Based on his research that forms the basis of *The Design of Everyday Things*, Norman outlines a handful of relevant design principles: [9]

- Visibility – can a user see the state of a device and its possible actions?
- Feedback – what is the object (tangible or intangible) doing? How does the user know the effect of an action?
- Affordance – what are the perceived and actual properties of the object that give clues to its operation?
- Mapping – what is the relationship to the controls and their effect?
- Consistency – how can objects be designed that are intuitive to the user?

These principles form the basis of Norman's user-centered design methodology. While the most apparent associations with these principles lie in interactive objects, such as interfaces both physical and digital, they can be extended for implicitly interactive objects. Even if a work itself is not interactive, these principles can be employed in the process of creating a fixed and/or non-interactive object. *(+/-) Pendulum* makes explicit use of Norman's principles in its responsive web application component due to its inherent interactive affordances. The sculptural aspect of the work, however, incorporates these principles but in a more implicit

manner. For example, mapping of latitude to the stepper motor may not be explicitly delineated to the user; however, the user may notice a relative change as the average position of the pendulum changes. Additionally, consistency can be seen in the work's motif of the number seven (i.e., seven Russian nesting dolls and seven hearts).

THE ARTIST AS DESIGNER

Art and design can be broken down, dissected and analyzed in a variety of ways; however, as these entities pertain to the author's creative process, art and design are unique counterbalances that exist symbiotically in the creation of artistic objects. Art and design are akin to Yin and Yang in Taoism. In Taoist ideology, Yin and Yang are two opposing forces that are thought of to be complementary. [10] Their symbolism references a sense of balance in the world. From the author's point of view, the duality of art and design serves as a balancing mechanism; the former provides mental fuel for aesthetic questioning, inner reflection and creative thinking, while the latter provides mental fuel to answer the question set forth in the most unobtrusive, concise and intuitive way possible. This process is by no means linear; there is a natural push-pull dynamic between the artistic process and design process. Iteration and fluidity between the two poles are paramount and the question-and-answer phases are ongoing.

CONCLUSION: THE EVOLUTION OF NOISE

Machined systems and computation are now vital parts of our daily lives. Many of us cannot live without some form of technology – from transportation to social interaction, complex systems are the clocks that keep the world moving forward. Many of us are also unaware of the remarkable growth rate of our global footprint. *(+/-) Pendulum* represents the author's reflection on the ways progress has affected daily life by interweaving our physical and digital lives. The work also reflects on notions of interaction. Inherent in design, interaction fundamentally connects individuals to individuals and/or individuals to themselves. Undoubtedly, technological developments have altered the way in which we communicate with others and ourselves. This work serves to reflect upon these rapid changes by synthesizing various dualities, the most apparent one being analog and digital. In order to do so, the author has expressed these changes by incorporating symbols and themes such as hearts, harmony and noise within the work. Furthermore, the piece serves as a reflection on technology's ability to incorporate greater complexity from user input and the opportunity for more participatory interaction models within technological art. Although the work relies heavily on technological mechanisms including computation and embedded electronics, the medium is not the primary message. On the contrary, the medium serves as a lens to magnify and exaggerate the drastic, ongoing evolution by shedding an ambiguous light on technology's ramifications.

By taking a Yin/Yang approach to the idea of analog/digital, individual/society and life/death, *(+/-) Pendulum* seeks to reflect

on the implied balance that must exist in order for harmony to exist in a system often littered with noise. Society at large can be thought of as a well-oiled machine propelled forward by a collection of individuals. In this piece, anatomical hearts serve as a symbolic reference to an individual as part of a larger entity, while the system in its participatory manifestation, reflects on the interplay between harmony and noise that result from a number of moving parts.

Adaptation and assimilation are remarkable characteristics in human beings. Technology has provided incredible opportunities, new developments are constantly emerging that allow us to not only expand our human reach but also simplify our lives. Industrial progress has enabled society to improve machinery enabling more complex technological developments. However, despite these perceived improvements, the nature of humanity is complex and the social characteristics of an individual are difficult to overlook. How will the exponential momentum of technological progress ultimately affect the world? As the world churns forward with its new developments, more devices impede our mental and social signal flow resulting in more opportunities for noise to arise in our microcosmic and macrocosmic systems. While prophesizing about the evolution of communication is a complicated feat, the future of interaction is changing drastically and the potential to lose sight of physicality may be on the horizon.

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RHYCYCLING – FLUID BORDERLAND. PROCESSES OF KNOWLEDGE CREATION

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ABSTRACT

This conference paper aims to give an inside view of different processes of knowledge creation that occurred during the two years of field research (2010 – 2012) on aesthetics of sustainability in the tri-national border area of Switzerland, Germany and France along the Rhine river. The research team worked with academic and non-academic experts (project partners, protagonists) and users of an interactive computer platform. The main focus is on where, how and with whom knowledge creation takes place and how it is presented. Regarding public presentations of *RhyCycling*'s research results, the non-textual presentation format (interactive computer platform) and its impact on reception are of interest.

Inter- and transdisciplinary teams are working increasingly with 'open' research concepts. This kind of continual transformation and circulation of knowledge in different forms and formats is an 'endless' and rather unstable process of knowledge creation. Regarding reception, those circumstances of instability are creative but demanding on the viewer's imagination. By perceiving the material of the interactive computer platform as a means for creating an individual storyline, transformation may be experienced through involvement, insofar as the platform supports possible reconfigurations of one's own lifestyle in a playful way.

INTRODUCTION

The river Rhine as a flowing border area defines the municipal, cantonal and national boundaries and is utilised in different ways. It is a microcosm with great ecological and socio-economic diversity. The research and exhibition project *RhyCycling* examined the border region of Switzerland, Germany and France along the Rhine and focused on how the human and non-human environment is connected.

The river and its environment are regarded as an interdependent network and communication system of human and non-human protagonists. [1] Bruno Latour's "political ecology," which calls for a transition from the doctrine of domination of nature to a participation of everyone in society, relies on that concept. [2] Beside the audio/visual research on recent (water ecological) circumstances above and below the surface and along the water's edge, with emphasis on fish fauna, energy and the utilisation of the riverbank, planned or imagined future changes for that space were examined as well. The research relies on the so-called "aesthetics of sustainability" which is found in (media) art and is affected by a perception of current theories of aesthetics including nature. [3] It differs from scientific and technical positions by the choice of the focal points in content, methods and the forms of presentation.

An interdisciplinary team conducted the research, based mostly on methods from visual anthropology, by observing phenomena of interest and by talking to different persons living and working at locations along the river. The team cooperated with partners from the local government, NGOs, universities or evaluation offices involved in sustainable development and ecology. The goal of the project was to provide insight into the network, the interdependencies, balances and imbalances of this ecological microcosm.



Fig. 1. The *RhyCycling* film team accompanied a kerosene tanker from Düsseldorf to Basel/Switzerland, 2011, *RhyCycling* team, set photography, ©*RhyCycling* team.

The edited research material – videos, sound essays, texts and graphics – was brought together in an interactive computer platform containing a complex search structure, visualising the interdependencies of content, places and keywords. Users build their own 'dramaturgy' and create their individual storylines by clicking through the material – an involvement which could lead to a (re-)considering, a reflection of the personal lifestyle. The platform was exhibited together with several video installations at the end of 2012 at the Port of Basel.

KNOWLEDGE CREATION

"Imagination is more important than knowledge. Knowledge is limited, but imagination embraces the whole world."

Albert Einstein

During the two years of field research in the tri-national border area, the research team worked together with academic and non-academic experts: with the project partners and with protagonists of the video recordings. This transdisciplinary collaboration consisted of different processes of knowledge creation, which were also brought under examination while exhibition visitors used the interactive computer platform (and continues to be examined

in the case of online users). Characteristics of knowledge were our main points of interest, dependent upon where, how and with whom knowledge is created and how it is presented. Therefore the interactive computer platform as non-textual presentation format of research results and its impact on reception are further focused upon.

The presentation and publication of research results, of knowledge, mostly takes place in textual formats although authors from science studies like Hans-Jörg Rheinberger or Karin Knorr Cetina argued that knowledge is constituted through experimental systems itself as well through the formats in which it is presented. [4] Therefore knowledge is not only inscribed in language and text. Media-based presentations of research results and processes of cognition are interdependent. That background served as a basis for the platform's concept of the interface, which was developed in the predecessor project *Check on Arrival* (about controlling systems at Zurich Airport) and adapted for the context of *RhyCycling*.

Both the transdisciplinary collaboration and the reception of the platform's contents by the public are processes whereby different forms of knowledge are created. Furthermore, not only is the determinable knowledge important, so is the material and formal conditionality of the production of knowledge. The tendency of artistic research processes, for instance, is to reveal how reflection takes place and with which medium. [5] Therefore, this approach to knowledge creation is an extension to aspects concerning media.



Fig. 2. Podium discussion *enkeltauglich?* during the closing event of the exhibition, 2012, Ketty Bertossi, photography, ©Ketty Bertossi.

To put it in a broader context: Internationally speaking, the involvement of the arts in research started at the beginning of the 1990s. An exception is, inter alia, in Switzerland, where research funding through federal funds began in the wake of the Bologna reforms around the year 2000. This development has led to upheaval. Arts as well as sciences were forced to reflect on their own approaches under these changed conditions. Meanwhile inter- and transdisciplinary teams increasingly act with an 'open' research concept. Knowledge creation, presentation and reception,

as well as the reflection of the related processes, are of central importance. Following the thoughts of Gabriele Brandstetter, who considers research to be an "ongoing process of rethinking" – of the achieved steps respectively the created (forms of) knowledge – a public presentation such as an exhibition, a performative event etc. wouldn't be the final result but a 'starting point' of an on going process which would be evaluated. [6] Hence knowledge could be seen as transformation and circulation between different forms and formats in an 'endless' process. This is a rather new point of view, especially in the realm of the performing arts with its limited time of access (duration of exhibition, concert length, etc.).

INVOLVED PARTIES

Team

The research team was interdisciplinary, with a range from humanities to natural science to art/design disciplines. A core team of four people – from visual anthropology, environmental studies, art theory, scenography – worked together quite closely for the concept and the research. Depending on the project phase and the personal expertise of each team member, we worked in different constellations, yet always with other collaborators who intervened from an 'external' point of view on the issues under consideration. It was a step-by-step approach and through negotiation we defined the direction of our research.

To the extended team belonged a musician who created sound essays of Basel's bridges – with a similar methodology used for the videos – working with sound captured from the urban environment. Furthermore the core team worked together with a graphic designer for the interface design and with a computer scientist who programmed the adaptation for the interactive computer platform. For the video production we collaborated with a video post-/production company.

Project Partners

In order to bridge the gap between theory and practice, the research team aimed at bringing together experts from different disciplines. In several workshops we intended to come to insights and knowledge despite differences and controversies. During the workshops we discussed the 'utility' of sustainability concepts – a rather worn term – and the future development of the region. The discussions about sustainability concepts were partly held in a controversial way. Finally philosophers proposed the terminology 'green culture' as an alternative to 'sustainability.' The somewhat abstract term 'sustainability' used particularly in a scientific, technical and economic context would thus be replaced by a broader and more politically established one. On the other hand and of equal significance, sustainability was explained as a concern of cultural interest – coinciding with a cultural studies approach and the transdisciplinary approach of the project. In the following workshop, after the group debate about first visions on the 'best of all worlds' in 40 or 50 years' time, it became clear that there is a pressing need to develop a 'grandchildren-proof' way of living. The debates were deepened in a panel discussion

at the exhibition's finishing event with experts from the local government, from design and visionary urban living projects in Switzerland and Germany involving the public in the debate. Questions about dangers, opportunities and courses of action were raised like: What does it mean to become climate neutral to leave a liveable world to our grandchildren? Are adequate efforts being made by the canton of Basel-Stadt, which aspires to a '2000-Watt-society' and is launching appropriate activities? What kind of framework should a role model country like Switzerland – technically and economically speaking – offer to realise sustainable energy and climate politics? [7], [8]

This thinking and re-visioning intended to reflect on one's own life. In particular, issues such as reduction and renunciation were covered repeatedly. Recently, these are also key issues in the debate on attaining a "good society" [9] or the "aesthetics of omission" [10] led by agents from the government or NGOs as well as from art and design.



Fig. 3. Podium discussants: P.M., author of Neustart Schweiz and Daniel Gafner, product designer postfossil, 2012, Ketty Bertossi, photography, ©Ketty Bertossi.

Protagonists

An agreement among those involved was important in order to 'create knowledge' with the agents on site (at least temporarily). The cooperation with the people being filmed resulted in an alternation between approaching and distancing, as anthropologist Peter Crawford describes with 'meandering' in the anthropological process of "becoming and othering." [11]

With this technique, researchers act during the interviews as 'accomplices' even if they do not agree with everything being said. In that moment of deep involvement they are interested in the other's opinion. They are approaching, trying to understand the ideas or the motives for certain actions – they are 'becoming.' Afterwards while analysing and editing the material they 'return' to their critical, distant roles. Regarding Crawford's concept, it is a process of 'othering.'

This concept is also appropriate for describing the situations we encountered while conducting semi-structured video interviews/ talks or observing everyday life and work all along the Rhine with a video camera and sound recorder in hand. We needed to create 'closeness' with interviewees, getting involved with them beyond the filmic situation. For instance, before we started to record, we engaged the protagonists in conversation and observed their working day.



Fig. 4. Filming of underwater construction site at Auhafen Basel/Switzerland, 2011, RhyCycling team, set photography ©RhyCycling team.

Afterward, we discussed our mutual interests in that specific field and what could be filmed jointly with them. During the filming we tried to create an atmosphere of trust. The starting point was a rather open question. The protagonists had the possibility of setting a direction, which we followed by relating to their answers – while not forgetting to seek answers to our own main research questions. The pattern of this qualitative semi-structured filmic interview as method of creating knowledge by a process of exchange (in questioning and answering) gives the interviewees a lot of freedom to talk about their own concerns.

Though the given involvement and collaboration of the involved, questions of representation and power structures cannot be overcome completely. This area of tension characterises the work in a fundamental way, but there are better and worse ways of collaborating. For instance, the methodological concept of the theorist and filmmaker Trinh T. Minh-ha to "speak near by" and not to "speak about" mirrors an alternative of involving protagonists with their own ideas and wishes of self-representation in the (filmic) process. [12] It has risen out of the postmodern, feminist, postcolonial debates on the "crisis of representation" in anthropology, the aim being to analyse and deconstruct limiting paradigms. [13]



Fig. 5. Filming of underwater construction site at Auhafen Basel/Switzerland, 2011, RhyCycling team, set photography, ©RhyCycling team.

Regarding recent theoretical and methodological approaches like those of Karen Barad, who engages “constructively and deconstructively (not destructively) with science,” deconstruction is “about examining the foundations of certain concepts and ideas, seeing how contingency operates to ensure the ‘foundations’ of concepts we cannot live without and using that contingency to open up other possible meanings/ matterings.” [14] Thus Trinh’s methodological approaches point toward the situation where those involved have to deal with concepts (of representation and power structures) but try to do it in a different, more adequate and empowering way.



Fig. 6. Editing the filmic discussion with the professional diver and business owner Serge Stephany, 2011, RhyCycling team, video still, ©RhyCycling team.

INTERACTIVE FORMAT

Why choose an interactive format of presentation and not a linear film format? We were looking for a format that could represent the heterogeneous research context as well as one that relies on the debates in science studies about processes of cognition and knowledge creation. Therefore, the edited research material was brought together in an interactive computer platform with a complex search structure that visualised the interdependencies

of content, places and keywords: The icons, keywords and location markers are related to each other. When the user clicks on a keyword, location or icon, they get a sample (or a ‘cloud’) with all the material belonging to it. The magenta references on the interface are a visual orientation aid.



Fig. 7. Interface of the interactive computer platform: Icons (A), keywords (B) and locations (C) are interrelated, 2012, RhyCycling team, screenshot, ©RhyCycling team.

MONTAGE AS PROCESS OF KNOWLEDGE CREATION

The subversive potential of montage lies in its capacity for altering the obvious first sense of an object, image or perspective by combining two or more elements. [...] Montage is the splintering of pre-established orders of visibility, but it is also the reassembling; and beyond these assemblages, new order may appear. [15]

The interactive computer platform assembles and arranges all the media products emerging from the research process, i.e., videos, sound essays, quotations and graphics. The users surf single-handedly through the materials and thereby create their own ‘dramaturgy.’

The aim is to let the visitor click through the material in a certain self-determined way: The media were organised in a predetermined way, according to certain keywords (invasive, toxic, etc.) and to locations along the Rhine, but the way people chose to surf through the material, creating their own dramaturgy, their own ‘story-lines,’ was self-determined. This approach is more ‘playful’ as opposed to a ‘classical’ structured one. There were no guided tours or the like. The viewer experienced different degrees of control over the interactive situation. In that sense the visitors were collaborating with the material.

The users’ interaction with the material as a form of knowledge creation is comparable with processes of montage, which were also fundamental to the interactive computer platform of *RhyCycling*. The platform offers the possibility to constantly arrange and juxtapose the content anew, as per the quotation mentioned above. The concept of montage suits well, both in its narrow [16] as well as in its more open characteristics. [17] Besides the concrete editing of the audio/visual material (as reflective practice), montage

symbolizes the reflections of the research team and its attitude toward aspects of topics through an unusual, possibly even irritating relationality of materials on the platform. For example, the keyword 'migrate' does not focus on people, but on routes of fishes and waste; debates on fish ladders or rhetoric about 'invasive species' reaching Basel via the waterway and mirrors the discourse from the populist right on migration. I call this reflective practice "a superior form of editing." [18]

Similar artistic practices were discussed at the ISEA2014 panel *Art in the Age of Networks* led by Cornelia Sollfrank: Felix Stalder mentioned 'meta orders' as platforms or archives containing different (online) material with the possibility to create multiple meanings – not only by the artists/authors but by the viewers as well. *RhyCycling*'s montage points to this as well, because users can create their own entanglements of the media contents through the non-linear form of reception. In a broader sense, montage refers not specifically "to an audio/visual or (by extension) a textual method, but to a sensibility and mode of engagement with the world." [19] This reference is not directed toward an already known order (of society, history, contexts), but rather on an instability created through montage. However, this instability that is inherent in juxtaposed elements and the forming of "gaps" links both, while distinguishing them from each other at the same time. [20] These gaps demand imaginative effort from viewers during reception and support miscellaneous points of view. It's about the "destabilization of conclusion in order to enrich it." [21]



Fig. 8. Exhibition view of *RhyCycling – Fluid Borderland*, interactive computer platform with projection and monitor mode, 2012, Ketty Bertossi, photography, ©Ketty Bertossi.

In an evaluation of the exhibition, interviewed visitors describe that some time is needed for reception in order to make the connections between the materials. This concentration and rearrangement is described as the "environment" in which one is located and where the contents are composed rather "unconsciously" – with the effect that after the reception one has "a kind of a 'loaded' head but in a good sense." Therefore, further development of the content is created actively by the users, who 'arrange' the knowledge on the platform they came upon and bring it into their own unique order.

In doing so, their own intention or question determines their experience with the platform. The 'storyline' they have created is a new arrangement of knowledge in the users' minds. This may lead to a self-reflective moment about their own lifestyles in relation to the topics of the material being viewed. The transformative nature of this advanced form of reception relates figuratively to both the viewer and the perceived contents. Transformation happens through the active involvement. The potential of this unstable intermediate space that emerges from montage is a rethinking of one's own behaviour – to a certain extent a 'negotiating' with oneself. It has an expanding, opening, touching effect. The 'loaded' head, the dizziness as a symbol for the experienced intensity may finally motivate action, to change something. Interactivity might support such a transformation process.



Fig. 9. Deep involvement at the interactive computer platform in monitor mode, 2012, Ketty Bertossi, photography, ©Ketty Bertossi.

CONCLUDING REMARKS

Inter- and transdisciplinary teams are working increasingly with 'open' research concepts. They focus on how, where and with whom knowledge is produced by trying to involve academic and non-academic experts in the process of knowledge production. How the presentation format influences the reception and, respectively, how the interplay between the medium and the knowledge formation appear with regard to *RhyCycling* has been described for the team, partners, protagonists and the public. As mentioned above, knowledge transformation and circulation that occurs in a continuous fashion and in various forms and formats is a knowledge creation process that is 'endless' and rather unstable. While the circumstances of instability are quite creative; they are highly demanding on the viewer in terms of imagination.

Regarding *RhyCycling*, the open dramaturgy allows the users to approach the contents by themselves. The emerging 'storyline' is an arrangement of new knowledge in their minds, creating 'multiple versions' of the perceived border area – which occurs on the foundations of multiple modes of knowledge creation. The transformative nature of this advanced form of reception has an effect on the received contents as well as the viewers themselves: transformation occurs through active involvement. In the best case, the activity leads to self-reflective moments in relation to the topics of the material being viewed. The circumstances of

reception and perception described above depend on 'agency' as well. To place it within the broader concept of agency as "response-ability," as an "enactment," agency is "about possibilities for wordly re-configurings." [22] Hence, the montage-driven possibilities provided by the interactive format of the platform offer support for reconsidering one's own lifestyle in a playful way.

For further information see:

www.rhycycling.ixdm.ch

www.rhycycling-online.idk.ch (interactive computer platform)

<http://explore-rhycycling.idk.ch> (material demonstrator)

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12. Trinh T. Minha-ha, *Framer Framed* (New York: Routledge, 1992), 96. [Quotation from her film *Reassemblage* (Senegal, 1982), 40 min.]
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SENSING ALL SAINTS' BAY AND PARAGUAÇU RIVER

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ABSTRACT

This paper presents the experience of an art and sensors practice that took place in Bahia, Brazil. *Sensorium* is a research and digital art project that aims to work with three major pillars: technological, environmental and artistic creation. For the technological approach we have researched free software and hardware, DIY practices, open source programming language, sensors and GPS. In the environmental axis we work on notions of environmental aesthetics, place and space and creating ways of perceiving the surroundings. The third approach, the artistic creation, is devoted to the development of aesthetic experimentation and environmental aesthetics on urban intervention, performances and data visualization. The focus of this paper is on the trip from the Baía de Todos os Santos (All Saints' Bay) into the Paraguaçu River to collect environmental data (objective and subjective data). This experience of sensing the river and sea surroundings resulted in a variety of art and visualization pieces. The paper analyses this practice and research, bringing up points of discussion on art practice, free technology and intimate science.

INTRODUCTION TO THE SENSORIUM PROJECT

This paper presents a part of the environmental intervention done during the development of *Sensorium: from the sea to the river* project. It is an extension of different other projects about the sea done at Ecoarte Group, UFBA (Federal University of Bahia), in Brazil and deals with 3 main axes: environmental, technological and artistic. At the environmental axis we worked on the notions of space and place in order to create form of perceiving the environment, focusing on questions related to the water around us. Water situation, uses, characteristics and sensations were relevant to this project. On the technological axis we experimented with free software/hardware, sensors and GPS. On the artistic axis we worked with environmental aesthetics, urban and nature intervention and data art. The term *sensorium* comes from Latin, from sensorial. Here we used it as art being this sensorial apparatus to measure, feel and interpret our surroundings. [1], [2] It is a mix of sensors to capture environmental data and geo-spatial assimilation plus the personal and subjective perception of the artist.

The four phases of the project *Sensorium* involves 4 phases of artistic creation: 1° phase is the creation of a mobile device with sensors to interact with people and place; 2° phase is the performance, the action with local community, the intervention on two sites (Salvador and Cachoeira) and the journey from the sea (Salvador) to the river (Cachoeira); 3° phase is the analysis and synthesis of the data collected, the construction of the data art, the data visualizations; 4° phase is the creation and show of an art exhibition of *Sensorium* project and its process. This paper focuses on the second phase of the *Sensorium* project, on the performance on the environment.



Fig. 1. *Sensorium* device.

After creating the mobile device done entirely with free software and hardware, it was time to go outside and experiment with it. There were three performances with the *Sensorium* device. The first was in Salvador during three days and took place in the historical center all the way to the outline of the city and bay, ending up on the main beach of the city. The device here had a cart to be moved around the city (Fig. 1). Its five arduinos and sensors were held on an open orange box showing in real time the data collected. The sensors measured: air temperatures, humidity, luminosity, gases, noise, water temperature, oxygen dissolved in the water, latitude and longitude. Besides the ear (microphone) to measure the noise, the device also had two eyes. One was a GoPro camera inside the box that recorded the sky and everything that was above it, especially the time people looked into the box. The other was an endoscopic camera, also called a snake and recorded the underground. The people experimenting with the device put the camera on many holes of water sewage, dirty water fountains, manhole, wastepipe, garbage can[...] Experiencing artistically the environment was important in this phase. Besides the urban interventions in Salvador and Cachoeira, it was essential to experience the nature.

Since 2009 we have worked artistically with the sea that surrounds us in Salvador. We developed some video installations, mapping projects, community artwork and interactive installations. Now with the *Sensorium* project we decided to go further away, crossing the whole bay and going upstream on the river Paraguaçu. We went from Salvador to Cachoeira by sailing boat. The idea was to feel the surroundings; to have the direct contact with the water, its landscape and its underworld.

For two days we collected physical data of the environment such as air temperatures, humidity, luminosity, gases, noise, water temperature, oxygen dissolved in the water, latitude and longitude. And also what

we called “subjective data,” our subjective notes as the psychogeographers did wandering the streets in the 50s and 60s, we did wandering the water on a sailboat. [3], [4] Our notes were made with pen and paper, photo camera, video camera and audio recorder. This way, we created data storytelling of this journey.

SENSING THE SEA AND RIVER

Arne Naess thinking on nature and human relation to the mountain once said that “[...] the smaller we come to feel ourselves compared to the mountain, the nearer we come to participating in its greatness. I do not know why this is so.” [5] Here we applied Naess’ feeling to the sea/river instead of the mountain. More than 90% of the participants of the project have never done this journey before. And even though they lived surrounded by water, the great majority have never been on a sailboat before. Therefore, it was very important to them to experience this feeling of being small on the immensity of the sea, to be able to participate in its greatness.

There were eleven persons in the group doing the water cross trajectory from Salvador to Cachoeira. Their backgrounds vary from artists, programmers, oceanographers, musicians, filmmakers, community workers, public servants, sailors, divers, designers, professors and students. Each person had his/her own way to sense the environment. The trip last two days, it took eight hours on the first day to reach Maragogipe and almost five hours the second day to arrive in Cachoeira. For some to be outside when it was raining, having no place to shelter was a challenge. For others, the idea of not having a proper toilet or being hours under the strong sunshine was a challenge. Time here also had another perspective. When planning the trip we decided on a two-day journey; some of the participants didn’t believe it would take that long. They were used to going from one city to another in less than two hours by car, so why by boat is it necessary to have two days? They could only understand that when they were on the water. One said, “Now I got it” when there was no wind and the boat drifted off aimlessly (Fig. 2).



Fig. 2. Scene of the first day on the boat..

On the boat journey time was stretched and did not have the same speed as in the city. Here observing nature, feeling the places, “doing nothing” made the clocks work slower. It related to the slow movement, to a new perception of life. Kevin Hamilton and Katja Kwastek in “Slow Media Art – Seeing through Speed in Critiques of Modernity” proposed some categories to the slow media art: Duration / Deceleration, Local / Sustainable, Disruption / Irritation / Mediation, Abstention / Ineffectiveness, Remoteness. [6] The *Sensorium* journey was an example of the slow media art. We could fit in more than one of these categories but the first one is the most suitable one. We had an enormous deceleration of everyday life. This action of data collection on the nature was completely different than the one on the city. Here our worries were weather, wind and tides. Not controllable variables, we had to learn how to wait: wait for the wind to pick it up on the first day when we stopped and drifted off aimlessly. Wait for the high tide on the second day to be able to leave Maragogipe and not have the boat stuck on sandbars. There was nothing we could do to accelerate, only wait for nature and feel smaller as Naess citation earlier.

Our device had a screen so we could visualize in real time the environmental data measured. We also collected images, videos and audios to record our experience of this space journeyed through in order to later recreate the notions of place and the perceived surrounding. There were environmental aesthetics on the relation of the onlooker and the environment, the onlooker and the device, the device and sensors, the data and its visualization and the habitat and the device. David Rothenberg, in *Deep Technology Revisited*, gets the concept of “deep ecology” and applies it to technology creating a new concept of the relationship of nature and technology. The author shows that the importance of nature in our lives is not in opposition to technology as many ecologists thought. Technology makes us understand better the limits of nature and depend more on it. For Rothenberg “[...] those who love nature ought to take technology more seriously, since it connects us more to nature, rather than separating us more divisively.” [7]

The experience of two days sailing and recording data of this environment made us understand better the nature that surrounds us. We could see which parts of the sea and river had more oxygen in the water and discuss how this affects the ecosystem. At the same time we could dive in the water, see its “hidden” under world, feel its magic.

In some locations the water was a blue appealing postcard: everyone wanted to dive in, mix with it, be part of it. In other locations the water was muddy brown: there were bottles, plastic, garbage floating. Despite of the disgusting look, we dove in and tried to perceive its nature (Fig. 3). We perceived the bay and river with technological sensors and with our own bodies.

GEO-SPATIAL AWARENESS AS ART

Awareness of the geographical space was an important point of this boat journey. The aesthetical experimentation of the place

took place in the way we moved from one city to another, drifting on the bay and river. Our knowledge of the space was enlightened and enhanced as a Michel de Certeau tour. [8] In contrast to a map, a tour is a narrative form of representation of a place, while the map refers to a determined place without mentioning the notion of movement. Our geo-spatial awareness was based on the movement, on the going; Certeau talks about the walking wandering in a city. Here we wandered on the water surface. Not as a single individual but as an entity, a concise body formed by a group of people.

With the act of sailing, exploring the place, we created a map of the journey. It is a data map of what we collected, it is the representation of our movement. The arduino GPS recorded our latitude and longitude every five seconds, this way drawing a line on an empty space of the screen. This line could be seen later on the art pieces *Caixa Preta do Sensorium* (*Sensorium Black Box*) and *Eletroviagemgrama* (*Electrotravelgram*). GPS has been incorporated as a medium for art since the 90s and got popular as locative media art in the beginning of this century. Artists appropriated this geo location tool to create new maps, new perspectives of the geographical representation. [9]

In 2012, Gavin MacDonald published *Moving Bodies and the Map: Relational and Absolute Conceptions of Space in GPS-based Art* analyzing this sort of artwork after 10 years of its popularity. Gavin said “Geographers and social scientists have argued that geospatial technologies are contributing to new understanding of space as relational and of cartography as processual and performative rather than representational.”



Fig. 3. Paraguaçu river mouth.

Nowadays, the process of walking, the movement and the performance in the space makes us understand better the territory and its relationship to society, politics, ecosystem and social issues. The *Sensorium* journey had this intention. It made us rethink the notion of space on the All Saints' Bay and Paraguaçu River. The group got aware of the polluted places, of its beauty, of the emotion of seeing river dolphins for the first time, of the dangers on the

water, of the different timing out at sea. It created an emotional bond of the people and this region. The experience of these two days sensing the sea and river got imprinted on their lives.

Data sensing art

Out of this “sensing journey” on All Saints' Bay and Paraguaçu River came a variety of art and visualization pieces. They were presented in an art exhibition at the Museum of Modern Art of Bahia in 2013.

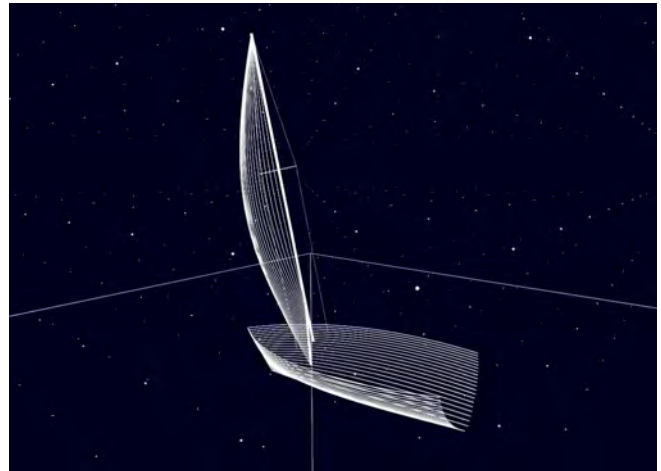


Fig. 4. *Vento em Popa* (Steady as she goes).

Caixa Preta do Sensorium (*Sensorium Black Box*)¹, *Eletroviagemgrama* (*Electrotravelgram*)², *Sensorium em Correlações* (*Sensorium in Correlations*)³, *Vento em Popa* (*Steady as she goes*)⁴, *Explorando Sensorium* (*Exploring Sensorium*)⁵ and *Video Mapa* (*Video Map*)⁶ intended to blur the limits between art and science. They show the scientific data in a more intimate and sensual way. [10] Data of oxygen dissolved in the water became abstract soft floating bubbles in *Caixa Preta do Sensorium*. And air temperature data creates a new sequence to the frames of the videos based on heat in *Sensorium em Correlações*. For us it was a great challenge to reach the balance between information and poetics. [11] Due to the museum's restriction of not allowing us to produce more immersive installations, we had to struggle to create something informative at certain points but not forgetting the aesthetic abstraction of the data. All the decisions were taken by the group. Everyone who was part of the boat journey collaborated on the creation of the pieces and was responsible for different parts of the exhibition. It was precisely a group show.

In conclusion, we had a sensorial experience of the journey with our bodies and our technological device. This resulted in a set of structured raw data that was analyzed and felt. Yes, we tried to feel the data observing it, seeing what it wanted to communicate to us. And out of all, we created an aesthetical and complex form of presenting it back. Hoping to evoke in the public some perceptions we could feel when sailing on the bay and river.

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ENDNOTES

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2. Url: <http://ecoarte.info/ecoarte/2013/11/eletroviagemgrama/>
3. Url: <http://ecoarte.info/ecoarte/2013/10/correlacoes-barco/>
4. Url: <http://ecoarte.info/ecoarte/2013/10/vento-em-popa/>
5. Url: <http://ecoarte.info/ecoarte/2013/10/explosensorium/>
6. Url: <http://ecoarte.info/ecoarte/2013/10/video-mapa-sensorium/>

THE DESIGN OF NATURE: CONSIDERING NOVEL ECOSYSTEMS

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INTRODUCTION

The merger of technology and biological matter is currently evolving in many different levels. The dichotomy between biological and technological is shifting boundaries and there is no longer a clear division between things, which emerge from nature and things that are designed by humans. Design and engineering principles and methods are increasingly appearing in a growing number of areas, e.g. due to possibilities to manipulate and modify biological matter. This kind of evolving development is also re-framing our relation to nature and what we understand with the term *natural*. Natural is being swallowed by technological on the level of material aspects, but also concerning our expectations and perception of nature.

“One can claim that the standardization of images, paper and inks in contemporary societies has produced a certain way of seeing. A comparable standardization in biological research can be seen through epistemic artifacts such as model organisms. For example, the fruit fly, *Drosophila*, is a model organism used in genetic research. The general expectation is that discoveries and knowledge gained from model organism will provide insight into the workings of other organisms. In the author’s and associates artistic project *The Fly Printer: Prototype No.3* (Fig. 1) a standard biological model organism is used for replacing a standard part of our common printer technology. The work points to a divide between the engineered and the organic. The biological and the cultural are reunited in this apparatus as a possibility to break through a common way of depicting the world, trying to find different surfaces and using strange apparatus to insist in the interstice of visibility” (Beloff & González Valerio 2014. The excerpt is from the text discussing the work *The Fly Printer: Prototype No.3*).

The author’s artistic projects and research are focused on the merger of the physical world, biological organisms and information and communication technologies. The author proposes a perspective into the merger between technological and biological as an evolving entity with many different kinds of actors, which together form an ecosystem that is comparable to scientists’ definition of an ecosystem in nature. The author contextualizes her recent projects in this paper through investigation into ideas concerning the design of nature by introducing ecologists’ concept of novel ecosystem. In the described projects it becomes visible how strongly our world is influenced by perspectives from technology and how embedded design and engineering approaches are in our thinking – not only concerning the technological but also towards the natural.

NOVEL ECOSYSTEMS

An ecosystem in biological terms is defined to be comprised of community of diverse organisms and their environment, including non-living components. In a recent introduction to the

Anthropocene Project by Haus der Kulturen der Welt in Berlin, Scherer & Klingan write: “Nature as we know it is a concept that belongs to the past. No longer a force separate from and ambivalent to human activity, nature is not an obstacle nor a harmonious other. Humanity forms nature. Humanity and nature are one, embedded from within the recent geological record.” [1] Following their statement on nature being no longer a force separate from human activity, one can also see that in this technological development plays a crucial role.



Fig. 1. *The Fly Printer: Prototype No. 3*, 2014, Beloff & González Valerio, fruit flies, glass, paper, inks, yeast.

The ecologists distinguish between few different ecosystems based on human impact. Intentional impact is visible, e.g., in agriculture, forestry and mining, in which humans have designed purposeful plans for utilization of natural resources that are typically directed towards production of goods. This is typically called a human-used ecosystem. In this kind of ecosystem technology is traditionally heavy machinery used primarily for transformation and maintenance of the land. Today these production methods are also getting connected to information technology via location-based and mobile technologies employed e.g. by agriculture.¹

Another interesting example of intentional impact on environment that is enabled by networked technology is the project conducted by The Natural History Museum of Helsinki University² that was based on citizen participation. Since the beginning of the 21st century, the city of Helsinki has experienced an increase of so-called city bunnies, which has been claimed to be an effect of people releasing their pet bunnies into nature. The city initiated a citizen science monitoring of the bunnies and since 2005 the Helsinki citizens have been able to submit bunny sightings online. The obtained results led to a realization that the bunny population in Helsinki was several thousands bunnies, which was considered problematic due to the increasing amount of damage to the city parks and other human-designed plantings. As a solution to the problem the city bunnies have been hunted down since 2010; they are fed to suitable predators in the Helsinki Zoo, advertised as local eco-food. This example presents a case of ecology where a specific (invasive) species is being restricted and maintained to return the environment closer to what is believed to be its previous “historical” state. One could say that this is one form of nature preservation where previous state is considered worth of restoring. A similar kind of thinking is also inherent in various land conservation efforts, including nature reserves.

The management of land e.g. with the purpose of reproducing the “historical” state of the specified ecosystem. However, the interests of the author is specifically in the concept of *novel ecosystem*, which is defined by Hobbs, Higgs and Hall. [2] The *novel ecosystem* is an area in nature or land, that has been impacted by human actions either intentionally or inadvertently in a way that it has developed a clear difference to its past “historical” state in its species variety. However it only develops to a novel ecosystem when it is left without any human management. Typical examples would include agricultural fields, sand pits or other extensive land use that has been abandoned and the land has been left without further maintenance. *Novel ecosystem* can also emerge, for example, when an evolving situation with invasive species is not restricted and maintained, in comparison to the previously described example of the invasion of city bunnies in Helsinki, but the species in their new environment are left proliferating without restrictive actions.

Also indirect human impact, such as climate change, can cause an emergence of *novel ecosystem*. In other words, *novel ecosystems* are the response of the biosphere to human influence. [3] The author’s interest in the concept of *novel ecosystem* was triggered by an underlying idea of the *design of nature* and its relation to evolution; how it seems no longer meaningful to consider separately what is “natural” and given and what is “artificial” and constructed by humans. Sacha Kagan writes: “Historically, the evolution of human cultures has been co-determined by ecological contexts. But in return, cultures have also been modifying “nature,” co-determining the further evolution of the ecosystems in which human societies establish themselves.” [4] *Novel ecosystems* are formed by biological nature set free and taking over abandoned land that

has been formerly impacted by humans. These ecosystems are also an integral part of our culture and our current mindset. The following section presents an interesting case of a *novel ecosystem* that has emerged as an effect of unintentional human activity.

A CASE STUDY

In 1942 a Second World War airplane, a German Junker, crashed onto the hills of Kilpisjärvi in the subarctic area of Finland. Today the location is marked on hiking maps as a site of interest and on the spot is a small signpost with information about the event. The interesting aspect is that when one looks at the site today, over 70 years ago, the crash site is clearly visible and looks as if the crash could have happened few months ago.³ In contrast to the surrounding vegetation a couple of meters away, the crash site is burned and bare and splattered by melted and rusted plane parts (which are gradually disappearing with visitors.) It is obvious that during the last 70 years the site has not recovered in a way one could expect.

This place presents one kind of case for a *novel ecosystem* to emerge; a location that has experienced human influence but it is not actively maintained. In this specific case the human impact has been sudden and unintentional, yet the development of technology has played a major role in it, which for its part has impacted the emergence of this particular *novel ecosystem*. The author’s interest in this location was triggered by two things; the fact that a small-scale violent impact on environment is still visible at a site like the crash would have happened few months ago and secondly, with a question: What is there when there seems to be nothing?

Mike Davis, an American author, writes in his book *Dead Cities: And Other Tales* about the impact for natural environment of the Second World War bombing on the urban areas in London that inadvertently created possibilities to observe urban nature set free. [5] The scientists were especially interested in the urban wastelands, such as abandoned railway tracks and other rubble areas caused by destruction. From WWII onwards, the city of Berlin has been continuously under observation by ecologists, which used the destruction sites in West Berlin as their primary fieldwork sites for the study of the development of urban flora and fauna. [6] This work became the foundation of the scientific study of urban wastelands and abandoned land, often called *ruderal ecology*; in which the term *ruderal* is based on the Latin word for rubble (*rudus*)⁴ and it refers to a plant that grows on waste ground. Davis writes how scientists were realizing that a violent event such as war, fire, bombing could act as a catalyst for a rapid expansion of previously rare alien species resulting in the creation of new urban flora. In reference to London he claims the following: “The botanical census of bomb sites in the City and the East End revealed a new pattern of urban vegetation adapted to fire, rubble and open space. Uncommon natives and robust aliens dominated this unexpected “bomber ecology.” [5] Similarly, based on the decades long studies on Berlin as an urban environment,

ecologists and activists have recently claimed that urban wastelands are valuable ruderal biotopes, which display dense varieties of species. [6] It is interesting that this kind of violent human-induced impact, which is possible in a technologically developed era, sterilizes the ground and further enables it to support and develop a completely new kind of flora and fauna for the site. These kinds of emerged urban margins and wastelands are random cases for *novel ecosystems* in urban area, however, only as long as they are left without management and any design plans, even without plans for preservation of the environment.

Returning to the over 70-year old crash site in Kilpisjärvi; what about this spot? This crash site has gone through a violent impact which, according to the scientists' claims, should enable new species to inhabit it. The crash site clearly shows visible differences to the surrounding undamaged environment, but at the same time there seems to be nothing new or old growing there. The author & company⁵ have collected soil samples from the crash site which have been later sequenced in a science laboratory⁶ using metagenomic sequencing technique.

The genomic sequencing technologies have gone through radical development and transformation during the recent decade. In the latter part of the 20th century, genes became a dominant idea about species' evolution. In the traditional gene sequencing individual organisms are extracted from environment, cultivated in a lab and the genetic information is sequenced from the defined individual species. However, the scientists realized that just 1% of the organisms taken from environment survived the laboratory cultivation; 99% were not surviving. Metagenomics is research on genetic material that is recovered directly from environmental samples. This technique was developed to be able to sequence large communities of microorganisms as a whole, which would not survive the cultivation in vitro. In metagenomic sequencing one takes a sample of soil (or water) without extracting and separating individual species; the matter and the whole community of organisms is sequenced in one go. The vast amount of data obtained contains a collection of short gene sequences, which are fed into software detecting the recognized sequences and producing a chart of possible species in that environment. The potential interests of scientists on these kinds of *novel ecosystems* are usually focused on a possibility of discovering novel microorganisms. For example, there is a fair amount of recent interest in extremophiles, which are microorganisms that can survive in extreme environments. These microorganisms potentially produce enzymes capable of functioning in extreme and harsh conditions, which may further lead to profitable⁷ industrial applications.

When looking at the larger picture of environmental metagenomics, it becomes very obvious how important one's environment is for one's survival. Another interesting aspect for the author is how metagenomic research bypasses through its method and technology the idea of an individual species. Andreas Weber has written in his account on concepts of nature, culture and politics:

"The emerging, more holistic paradigm of biological regulation and identity now holds that the identity of biological subjects is often not that of one species alone: the majority of organisms must be viewed as "metabiomes" consisting of thousands of symbiotic, mostly bacterial species, according to recent research." [7] Even if the researchers later aim at mapping recognized gene sequences to construct more complete image of possible species in the sampled environment, this kind of sequencing method itself bypasses the idea of individual species. In comparison to traditional gene sequencing that targets separated individual species, in metagenomics the genomic data is produced from an environmental sample that contains various different species. This sample with its organisms is sequenced as such without prior separation of individual species. One can say that this kind of metagenomic data has no fixed point of termination, such as a completed genome sequence of an individual organism. There is no end and no clearly bordered and defined individual species; the borders of an individual start blurring. Individual no longer matters as a single or entire organism, rather individual organism blends with its environment and community.

Interesting comment was made in a discussion between the author and an expert⁸ on environmental metagenomics on the amount of data, which is so large that according to the expert it is possibly cheaper to store it in the biological matter at the moment; in other words in the organism itself rather than in a digital data storage. The author's on-going artistic research on the case study of Kilpisjärvi crash site has one large challenge ahead: what now? How to interpret the data, which is received in the form of a phylogenetic tree and what does it actually mean? And what does it mean from the perspective of an artist?

TECHNO-ORGANIC ECOSYSTEM

A project by the author, the *Appendix* (2011), is a networked tail designed for a human. The idea for the work was to explore how technological networks enable new kinds of connections and relations to the natural environment, as well as arbitrary human constructed systems. The *Appendix* is designed to become part of the user's physiological body, however, the movements of the *Appendix*-tail are triggered and controlled by the real world events that are external and not controlled by the user. The horizontal direction of the tail movement is determined by the direction of the Helsinki city transport tramway no. 3 in real time and the vertical movements are triggered by the current wave height data from the Baltic Sea. These connections were intentionally selected to have no predefined purpose or self-evident meaning for the user. Rather, the *Appendix* aims at constructing a situation in which it is possible to investigate techno-organic connections that merge the user's body and the environment into a single entity.

Eric Kluitenberg has written about a concept of *techno-ecologies* according to which technology can no longer be understood standing in opposition to biological and social relationships. The technological ecologies emphasize our connectedness to our

environment and our dependence on the available resources. "They become ecologies in which social relationships are deployed, not just with other human beings, but also with other organisms and even inanimate objects." [8]



Fig. 2. *The Appendix*, 2011, Beloff, electronics, textile, wood, horse hair, plastics, network connection.

Following a similar line of thought the author is investigating an ecosystem, which is the merger of physical world, biological matter, technology and networks. This ecosystem includes various kinds of entities: living actors, such as humans, non-humans (plants, animals, mushrooms, micro-organisms, etc.), but also novel technologically manipulated organisms, such as ones based on synthetic biology or gene manipulation. Furthermore, this kind of ecosystem contains actors that are non-living in biological terms, but which have life-like properties or behaviour, e.g. artificial life organisms and evolutionary systems and intelligent robots. It can be considered as a *novel ecosystem* that is evolving in many different layers at the same time. One can claim that in our current societal and living conditions the formation of this kind of ecosystem has passed the point of no return; it no longer has a possibility to return to its previous or original state. One can see various indicators of this merger of digital, technological and organic matter. The commonly visible are, for example, the mediation of our environment through the use of networks, ubiquitous computing and various sensor technologies, including the wide use of mobile phones, GPS-modules, webcams for environmental observation and the recent increase in the use of drones. But similarly the *novel ecosystem* is present and visible in the field of life sciences and developments in synthetic biology. These various aspects are forming our current environment and also our expectations are evolving together with changes in the environment.

This investigation into these kinds of *novel ecosystems* is an attempt to frame various technology driven developments that include or concern of biological and living organisms. It also points

to the underlying ideas of the author's artistic research and projects. The author's recent interests are focused on entities, which are mergers of technological data based components and physical, often living, components. In the author's projects these entities are seen as structures that are based on connections, rather than constructed singular objects with clear borders. These projects speculate on the transforming relationship between an enhanced human and an enhanced environment. Many of the author's recent works have been anchored to Gregory Bateson's statement from 1969 that the unit of survival in the biological world is an organism plus its environment. [9] The author considers Bateson's statement in our contemporary environments and within the conditions afforded by the merger of technological and organic ecosystems.

A Bioreaktor by L. Beloff & M. M. Borch (2014, in-progress) is a project born in the intersection of art, design, biology and technology. It is constructed as a symbiosis between a human and microbial fuel cell consisting of microbes and algae. The initial starting point for the project was one of the key questions of our future: energy. However, instead of aiming at influencing the human behavior towards more a sustainable way of using energy or proposing plausible solutions for the future, this project is focused on the underlying perception about energy and life as a symbiosis within its surroundings. Following Salminen and Vaden's writings, it is almost impossible to think about energy as an object or material; its effects are perceivable (or sensible) but itself "energy seems to name at the same time something internal, immaterial and spiritual and something material, concrete and physical." [10]

Microbial fuel cells have recently generated a lot of interest among the energy production industry. With this project the quest was not about maximizing the effectiveness of energy production, but rather the question was how small microbial fuel cell makes sense and what happens when one (a human) will become a life support system for it. The work consists of a wearable microbial fuel cell, which contains oxygen-producing algae and soil bacteria in the same closed system. The human is a necessary component for the flow of water within the system. Additionally, the system will produce digitized data about the current status of the whole ecosystem. On the one hand, the project challenges our perception of production and consumption of energy. On the other hand, the project explores concretely the formation of an ecosystem with dependencies which contains networked technology, microorganisms and a human.

Multiplicity of relations is one of the key conditions for the recent projects by the author. This is seen in the extension of the works through connections and relations to the real world, which reach beyond their immediate material presentation. These produced artifacts do not represent, but their existence as well as the users' presence is tightly intertwined into the concept of ecosystems as a merger of technological and organic.



Fig. 3. *The Bioreaktor*, 2014 in-progress, Beloff & Borch, algae, bacteria, plastic, electronics, textile.

CONCLUSION

We are increasingly becoming aware of the transition which our world and we are experiencing towards a new idea concerning the concept of nature and the meaning of the term *natural*. Our approach to biological nature is gradually being coloured with perspectives from design and engineering. Today, not only material things but also living organisms are designed on computers and produced or modified in laboratories. Equally, our technological devices form an elemental part of our current world. During the last decade, these everyday devices have extended and transformed concepts such as time, presence and distance. Andreas Weber writes in reference to various scientists and theorists: “organisms are no longer seen as machines competing with other machines, but rather as a natural phenomenon that “creates” and develops itself in a material way while continuously making and expressing experiences.” [7] The on-going merger of technological and biological matter seems not possible without treating the living matter with a similar perspective to that which we use for the development of technology. Technological development always implies an intention, which is typically directed towards creating purposeful functionality. What does it mean when a similar kind of intentionality is present in the molecular level manipulation of biological matter? How does our relation to the biological or natural, world change with technology-based developments and with new possibilities to observe and connect to nature through technology?

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2. Also other institutions are conducting surveys of invasive species in Finland using citizen science methods, e.g. Ministry of Agriculture and Forestry.
3. The author is part of a working group investigating the multi-layered story of the site: Oron Catts, Laura Beloff, Kira O'Reilly, Kathy High, Andy Gracie, Astrida Neimanis, Antti Tenetz. The project was initiated within Field_Notes workshop organized by Finnish Bioart Society <http://bioartsociety.fi>
4. <https://www.wordnik.com/words/ruderal> [accessed 24.10.2014]
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6. With the help of Professor Nils Peder Willasen at the University of Tromsø.
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8. Tromsø, January 2014; a discussion between Nils Peder Willasen, Oron Catts and the author, Laura Beloff.

THE FUTURE OF THE DOMESTIC OBJECT 2025

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ABSTRACT

In the current techno-social digital era, objects are significantly shifting in how they are made and for what purpose. Objects that are mass-produced are starting to be engaged in social networks and provide additional value by being technologically connected to a social network. Business models around ownership of goods are starting to shift, from the individual ownership of products to a sharing model with a community. Given changes in function, ownership and technology, how might designers create domestic objects that will remain relevant over the next ten years?

This paper examines how standard product design processes may accommodate foresight methods and future-state considerations. Two foresight methods are explored: 1) horizon scanning which identifies changes in the broader contextual landscape and 2) comparable scenario development, derived from the three axes of function, ownership and technology, presented here as the *FOT Cube*.

INTRODUCTION

This paper examines how a nested framework process informs how product designers can approach designing product for the future. A nested framework process is a series of applied research methods used in combination. This approach is important because it allows new ways to approach complex problems. What foresight methods allow us to anticipate are the needs of a consumer in a rapidly changing technology landscape. By considering nested framework processes and foresight methods this paper intends to anticipate how new innovations can be developed.

Foresight methods are used to inform and navigate the yet undefined future ecologies of the domestic objects, as they become technology engaged. Examining the tension in the movement of function, ownership and technology, the *FOT Cube* model was designed as a process innovation method to define polarities, navigate the complexity of these movements and their possible co-mingling. The *FOT Cube* model acts as the framework of eight worlds that may exist in a decade.

The *FOT Cube* is made up of a three-axis formation. The functional axis examines the value of an object and why one object is chosen over another to complete a task. In this axis designers explore how to create meaningful additional value. Further investigation seeks to understand what objects do and, how they are being tasked for multiple purposes. The Ownership axis identifies changes in the purchasing patterns and ownership of objects in western consumer culture. Discussion of how this impacts object design is informed by economics, as well as the shifting polarities between the individual ownership of a product

versus its sharing with a community. The Technology axis discusses how technology and its applied tools are changing design and the polarity of designing objects with technology to considerations for designing networked objects. The intention of the *FOT Cube* is to be a part of designer's process with innovation product design as part of the comparable scenario development or "World Design" process. It also presents a process for designers to create meaningful additional value in object design.

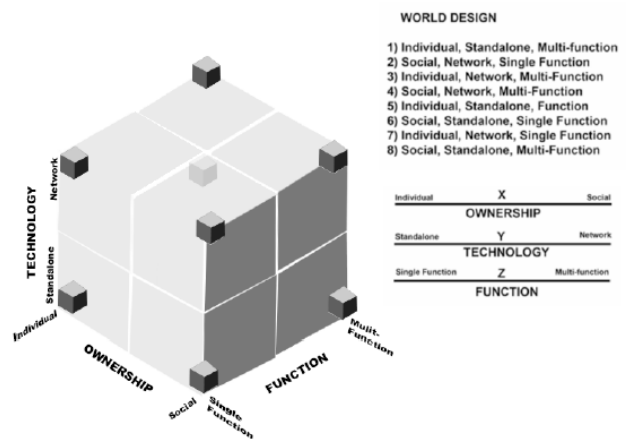


Fig. 1. *FOT Cube Model*, © Slavica Ceperkovic.

METHODS

In designing a new process for innovation for product designers, foresight methods are used as tools to think through the complexity of the shifting models of function, ownership and technology, in order to attempt to anticipate how to design for possible futures as well as understand implications of domestic objects over time. The time horizon of 2025 is significant because it allows us to see potential impacts of current trends and to look beyond current barriers of current day technologies. My methodology utilizes the following: foresight and my contribution to the discourse, the *FOT Cube*, in order to examine the future of design, usability and technology engagement.

FORESIGHT as Method

Foresight horizon scanning and matrix development are used in this research as a method to develop possible futures of objects in 2025. The year of 2025 was chosen as it is far enough in the future to understand the implications of the horizon scan in a meaningful way and to think beyond current technologies as barrier. As a research method, foresight can be used to create insights, learn demands of new markets and develop implications for action in complex territories. By using foresight methods to

develop new products, a context is created to directly enable creativity within the constraints and frameworks in design. The generative phase of foresight is the foundation for a process of inquiry. It consists of gathering, analyzing and synthesizing of existing knowledge, in order to codify knowledge into a new vision of the future. Rafael Popper indicates three main stages of this generative phase: Exploration, Analysis and Anticipation. [1] Exploration provides an understanding of main issues, trends and drivers. A driver is the understanding of what is propelling the trend. Analysis is an understanding how the main issues; trends and drivers influence each other. Anticipation examines previous considerations and aims to develop possible futures.

Popper indicates trend extrapolation and impact analysis are long established tools of forecasting. [2] This offers valuable insight as a proven method of inquiry. Denis Loveridge articulates the “Steep V” acronym examining trends in social, technological, economic, ecological, political and values based categories, which aids in understanding trends by looking beyond a niche scope. [3] Trends are established by gathering signals of shifts, which may build into a larger trend. Signals provide detail to trend insights that could point that can be further developed for larger scale scenario development for policy processes. Further, Rafael Popper articulates the “Foresight Diamond,” which is used as a framework to examine qualitative, semi-qualitative and quantitative methods extrapolated to creative, interaction, evidence and expertise based methods. This is significant because it articulates additional methods that can be used in the brainstorming process.

The FOT Cube as Method

The *FOT Cube* has been created through this research as a new method of inquiry. It generates a structured framework to investigate new object design and challenges via its consideration of techno-social networked technology as part of the product design process. The *FOT Cube* guides designers in considering how their product situates itself with regards to function, audience and engagement. Developing a strategic conversation about the future of objects, my research has led me inquire the ideation process for product designers, in order to invent a new process. When creating new products in a rapidly changing technological environment.

Kees Van Der Heijden states that a matrix approach is appropriate in situations of considerable uncertainty. [4] In terms of understanding the inter-relationships of driving forces, typically, a two-by-two matrix of critical uncertainties is used to generate several plausible scenarios for plausible worlds. The cube model, developed as a 3-axis framework considers the polarities in function, ownership and technology in product design, to act as grounding points of considerations for product designers. A cube can examine the 3-axis of polarities to create eight possible future world scenarios, which are to act as a guide for re-imagining the product through different lenses. These scenarios are valuable because they generate a well-rounded view of the possible world the objects are designed for.

Perhaps, as Heijden elaborates, the matrix model maximizes the range of scenario outcomes and the potential impact. The cube model however, can redefine the foresight process in a significant way by allowing on a guideline on elaborated worlds, thus maximizing outcomes. The nature of the choice for scenario dimensions, are what is high-impact and highly uncertain for a large range of possible impacts. [5] I chose to investigate the cube model to elaborate on possible futures within a stable framework. Trends thus texture and develop the world’s design to present possibilities of future uncertainty.

As stated, additional criteria are implemented through a variable set of trends. These design criteria allow us to imagine objects in new ways from its origin to predicting its future. The contribution of the *FOT Cube* to product design is to incorporate the techno-social, shared ownership and technology networked functions as considerations in product design. In considering the 3-axis, the left side direction of ownership, technology and function are heavily rooted in traditional design and its history. By incorporating all facets of 3-axis, function, ownership and technology, the *FOT Cube* examines singularity versus multi-function with the individual and the social and standalone and networked.

B Single function – FUNCTION – Multi-function à
 B Individual – OWNERSHIP – Social à
 B Standalone – TECHNOLOGY – Networked à

The left side of the axis could reflect historical and some current day products. Those objects specifically designed to have a single function, to be owned by an individual and have no connection to a network. The consideration weighted on the right hand of the axis pull consideration of objects into the future, shifting the product into multi-functionality, shared ownership, networked connectivity. This shift pushes products to a tipping point, changing products into techno-social products with multi-functional services. It fundamentally changes how products are conceived, fabricated and distributed. In the perceived threat of 3D printing and the masses creating individual, standalone objects, with single functionality, the cube proves new ways to ideate and conceive of intelligent objects and its potential use for mass distribution.

Trends, Impacts and World Design

Using horizon scanning, trends were defined, as well as articulated through graphs, charts and creative output, in order to generate discursive options. The process of identifying a trend requires identifying signals in the present day within the last five years and classifying larger underlying currents to encapsulate a larger trend or issue. A listing of trends used as part of this world design process is articulated in the appendix.

Trend implications on the axis were recorded based on the potential impact on the object’s value either in its function, ownership or technological engagement.

	Single Function	Multi- Function	Individual Ownership	Social Ownership	Standalone Technology	Networked Technology
Computer knows best	*	*	*	*		*
Nomadism				*	*	
Co-Op Life				*		
Born big brother	*	*	*			*
Because my body tells me so	*	*	*			*
DIY Tools	*	*	*		*	
Grow something	*	*	*		*	
My house hugs trees	*	*	*		*	
Power up	*	*	*		*	
Make me some lemonade	*	*	*		*	
Crowd source everything				*		*
Having fun standing still	*	*	*		*	
Regulated garbage	*	*	*			
Knock it off	*	*	*		*	
Dissolving monuments	*	*	*			*
Delayed marriage	*	*	*			*
Stackable homes	*	*	*			*
Experience based gifts	*	*	*		*	

Fig. 2. Trend Implications on Axis © Slavica Ceperkovic.

IMPACT ON WORLDS

This was further categorized into the eight possible world design scenarios. Once logic of the world was defined worlds were named.

Worlds are set in the future year of 2025. These worlds were designed based on the polarities of the axes of ownership, technology and function. The implications of the trends texture the world design of eight possible futures. It is important to place the timeline far enough in the future to imagine new technology possibilities outside of current toolsets to imagine new possibilities. This is structured more abstractly, to create possible worlds and futures as an ideational construct for designers to approach new worlds with its own logic to design for. An articulation of the eight worlds designed can be found in the appendix.

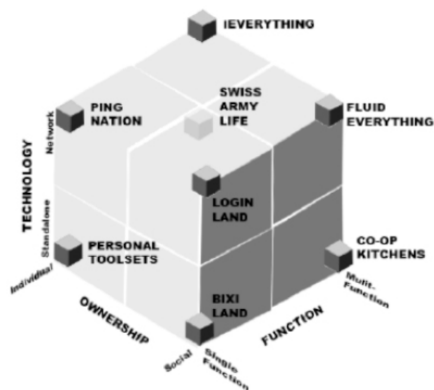


Fig. 3. Future World States, © Slavica Ceperkovic.

Eight possible worlds as a source for potential future for objects to inhabit create a rich basis to ideate and brainstorm possible objects an identified problem. It is important to note that, if an

intended problem is focused on only one polarity (e.g. single owner, one function), all worlds may not need to be explored. As the perimeters of the worlds are firmly set, additional questions can be asked to start of the ideation process.

CONCLUSION

What world design offers in the object design process is the understanding of where the objects live and how notions of home could change. In today's society, a shift from mass consumption to niche consumption has changed the function and economic ownership of products. Mass production has shifted to mass product services with consumers engaging with products for a longer period of time and continually paying to enhance objects. Technology will always be a variable and its standard is a moving target that is rapidly developing. I have examined why we purchase the way we do and the important consideration of the techno-social future. How objects integrate with their own online presence and lifespan can exist long after the object itself disappears. In other cases, objects could take years to get to market and how approach contemplating its techno-social relationship to an audience when chances are, new platforms are yet to exist.

The methodology of foresight and the *FOT Cube* aids in understanding how designers can approach this complexity and create clear boundaries in understanding how the object could operate in various worlds and its possible co-mingling.

Developing a trend list of current signals in the changing ground of social, technology, ecology, economic and value factors challenge both the object and its design in the future. By developing eight worlds, although it allowed a certain complexity in how to consider an object, it creates difficulties and problematizes the parameters in the design idea process. Although Heijden elaborates that this model to maximize the range of scenario outcomes and potential impact, its complexity is often difficult to navigate and differentiate when in the moment of creation of design ideas. What my contribution of the *FOT Cube* allows for is an integrated and holistic view of objects and usability in order to create a framework for ideation. By creating this process no one world can or would dominate but rather a multiplicity of overlapping of worlds would exist.

In closing, using foresight techniques leads to a new language construct in how designers can approach object design in the complexity of a techno-social age. By incorporating the *FOT Cube* model, designers can move beyond current approaches and gain a complex understanding to innovate products for consumers of the future.

Areas for Further Inquiry

This paper articulates a process for the understanding of design for future products may need to incorporate is an ongoing, service-based model for products engaged with a community and articulate the designer's responsibility to consider post-delivery phases of

that product. The intention of the *FOT Cube* is to be nested with other methods such as foresight and world design in other product development process frameworks. Once the problem has been framed it is anticipated that this process should be used as a generative brainstorming method that should lean into an iterative prototyping and testing phase resulting in a final product design.

APPENDIX A: ARTICULATION OF TRENDS

Social Trends

Computer knows best: This examines the growing trend of North Americans finding their significant others through digital online services and how courtship practices are changing.

Nomadism: This trend examines the impact of decreasing value of home ownership in the United States. A migrant working class may change buying patterns and decisions and the duration of stay based on employment and entrepreneurship opportunities.

Co-Op Life: As urban centers become increasingly dense, consumers' patterns are starting to shift to shared models of ownership and rent time with objects that were once owned.

Technology Trends

Everyone is big brother: Technology is becoming increasingly omnipresent from the increased public surveillance in dense North American urban centers by law enforcement to the emergence of wearable consumer cameras such as Google glass™.

Because my body tells me so: Wearable biofeedback devices have started to emerge in the consumer marketplace as fashionable accessories. This device driven method of self-monitoring movement has built new communities online as well as big data statistical database of consumer personal body performance.

DIY Tools: "Do it yourself" maker culture has grown from hobby projects to becoming an industry. Through maker channels such as Etsy™, individuals can develop and distribute products to consumers without third party distribution such as storefronts.

Economic Trends

Make me some lemonade: New micro funding models has acted as a catalyst for new market of micro-entrepreneurs and new niche market demands.

Crowd Source everything: This trend examines how crowd based services have become increasingly powerful in the marketplace. From audience participation in developing content for merchandisers to leaving recommendations on social networks, crowds have influenced how products are made and inform consumers choices.

Having fun standing still: In economic strained times, North Americans are changing their patterns of purchasing goods and

experiences with a focus on improving home surroundings and local experiences.

Ecology Trends

Grow something: Locally grown and one hundred mile diet movements have brought the question of buying food closer to home and have in addition created hobby farms of small gardens in dense urban centers.

My house hugs trees: Environmental sustainable housing has become a feature set in new urban developments. How a home integrates into its environment and leans into borrowing power rather than demanding it had become a growing demand.

Power up: With increasing demand of power from consumers, global electricity demand is projected to double from 2010 to 2030.

Political Trends

Regulated garbage: As government becomes more involved in the waste economy, garbage will increasingly regulated in how consumers can dispose of products in a cost-effective way.

Knock it off: In the current uptake of 3D printing, products are easily replicated and printed on demand. Piracy has shifted from the black market to the home market, where users can share schematics to print objects at home.

Dissolving monuments: With the increase of an individual's digital footprint, rights to dissolve or preserve their online presence are still in question with lawmakers. Virtual possessions such as digital music, email address or other digital properties dissolved are inconsistent in how they can be preserved, passed on or dissolved.

Value Trends

Delayed marriage: This trend examines the growing trend of North Americans delaying marrying until much later in life.

Stackable homes: This trend examines the trend how dense urban centers are growing faster than their suburbs for the first time in decades in the United States.

Experience based gifts: This trend examines how experience based gifting over object-based gifts are on the rise.

APPENDIX B: ARTICULATION OF EIGHT WORLDS

World 1: Swiss Army Life

Swiss army life is a world where individual own objects that can do many things and are developed using high technology but remain off the grid.

Characteristics: Multi-function, Individual Ownership, Standalone Technology

Trends that impact this world are: DIY Tools, My House Hugs Trees, Power Up and Make me Some Lemonade.

In the year 2025, this world we see that criteria for objects at home are highly individualized, can accomplish multiple tasks and is not connected to the owners social network. With easy access to 3D printer individuals on an as needed basis print objects. With the ability to easily print and customize whatever object you would like as part of small manufacture runs, scarcity is not an issue in this world. Objects have become more sophisticated go beyond one basic function and can accommodate multiple would be able aid in more than one task. Although self-consciousness about waste, a greater issue on how to effectively recycle objects and transform them into new object for themselves has become value in this world. It in fact, makes your objects more unique and individualized. One main issue in this world as textured by the "Power up" trend, is that with power at a premium, objects have no or very little battery life and often man powered if energy is needed to complete its function.

World 2: Login Land

Login Land is a world where all objects are developed for communal use and designed for one primary function. It is important to note that this object is always online and networked to a social network.

Characteristics: Single Function, Social Ownership, Networked Technology

Trends that impact this world: Computer knows best and Crowdsourcing everything.

In the future, marked in this research as 2025, we see that objects at home are intended for more than one consumer. Objects in this world are shared for a reason and are produced by a large company and mass distributed. Given the digital support, this would be considered a luxury item. It is something that could exist in common spaces within a home environment and the digital enabled value to push content from our networks into our homes creating personal billboards is a key feature. The product is also networked to the internet and is intended to have a single function. The value of an individual's social network is integral to the design of objects in this world. Users of objects are always required to log in to use the product. Experiences with the object are consistent consumer to consumer with the only variable being the techno-social content.

World 3: Everything

iEverything is a world where objects have multiple uses, designed for specific person in mind and connected to a network at all times.

Characteristics: Multi-Function, Individual Ownership, Network Technology

Trends that impact this world are: Born big brother, Because my body tells me so, Having fun standing still, Stackable homes and Delayed marriage.

In 2025, in this world we see that objects at home are designed for one person. This is a gadget-based world, where the more an object can do to help you, the better. Although objects are designed to be integrated into social networks, this is an intensely private world. It is important that this object helps an individual on day-to-day tasks and be integral to their routine. As privacy is an underlying concern in this world, a consumer might want passive signals to engage with their network. Objects would be developed for people on a budget and is mass-produced to keep costs low. The lifespan of this object is very long and would be integrated into personal habits that could be measured over time.

World 4: Fluid Everything

Fluid Everything is a world where objects are communal, have multiple functions and are connected to a grid.

Characteristics: Multi-Function, Social Ownership, Networked Technology

Trends that impact this world: Experience based gifts.

In this world we see that objects at home are shared and have the capacity to work together. Domestic objects in this world are connected to a network and designed for more than one function. This world is filled with unique experiences and is constantly shape shifting. All objects are seamlessly integrated from one object to the next and always on. This object is shared, connected to a network and is mass-produced. It is not a hand made object and it is the delight of using the objects in combination that make them unique to the user. It is important to note, that only one trend impacted this world as an object that is social in ownership, networked and has multiple functions. Creating unique socially owned networked experiences with objects might be an extreme consideration in object design.

World 5: Personal Toolsets

Personal Toolsets is world where objects have a specific single use for a specific individual. This is not a shared object. Objects can be developed using a high-end technology, however it remains off the grid.

Characteristics: Single Function, Individual Ownership, Standalone Technology

Trends that impact this world are: Grow something, Regulated garbage and Experience based gifts.

In 2025, this world we see that objects are designed for an individual, that they do not have any embed technology to connect the object to a network and have a single purpose function. Little has changed in this world in terms of object design since 2013 outside of technical processes in designing the product. What propel the objects into the future are the influences on trends. Experiences are integral to object design. Toothpaste for example

could have a unique taste. Object can be hand made or mass distributed. Money is not an issue in consuming goods however; customers are environmental conscious, which is reason for a shift in product design.

World 6: Bixi Land

Bixi-Land is a world where objects have one function and designed to be shared. It can be constructed by technology, however it is not connected to a network.

Characteristics: Single Function, Social Ownership, Standalone Technology

Trends that impact this world are Co-op Life and Nomadism.

In 2025, objects in this world are communal and shared. There is no concept of ownership with a community access is standard mentality of inhabitants in this future. Objects do not have any connection to online social networks or capabilities and are purely intended for a single function in the home. Objects could be expensive or only used occasionally and therefore shared for to be accessible. Inhabitants of this world are transient and the value of objects and home have shifted in that products do not have a sense of preciousness attributed to an individual owner and can easily passed on. Uniqueness of the object is not important as its ability to accomplish one task effectively. The notion of “Home” is changing in this world and could be a short-term rental, hotel or staying at other people’s homes as temporary locations.

World 7: Ping Nation

Ping Nation is a world where objects are individual owned, have one specific function and are connected to a social network.

Characteristics: Single Function, Individual Ownership, Networked Technology

Trend that impacts this world: Delayed marriage, Regulated garbage and Computer knows best.

In 2025, this world we see that objects are designed specifically for individual within the home. Objects are connected to the internet and social networks and are intended for one function within the home environment. Objects are simple in its design with limited functionality and being connected to a network becomes an important consideration in how objects are designed. The network recommendation highly influences objects and objects are fixtures within the home and are kept for a long duration as opposed to a short period of time. Items in this world are mass-produced and could be considered a luxury-based item. Owners of these objects are environmentally conscious and products have minimal impact on the environment and could be made of recycled materials.

World 8: Co-Op Kitchens

In Co-op kitchens objects have the capacity to do many things and

are designed to be shared. Although objects can be designed with technology tools this product is not connected to a network.

Characteristics: Multi-Function, Social Ownership, Standalone Technology

Trends that impact this world: Nomadism and Co-op life.

In 2025, this world’s objects are built to be shared and have multiple functions. These are to be considered universal objects within the home. It becomes a standard where everyone has one and it’s has no technology network capabilities. Objects in this world are mass-produced and are inexpensive. The owners of these objects are transient, so consistency of an object in one household would easily translate into another household.

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THE MOON IS A MIRROR: ORGANIC AND NATURAL SCREENS

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ABSTRACT

The moving image's current preference for the clear glass screen ignores its roots in natural and organic materials that were mediated based on their qualities of opacity, translucency and transparency. Media history reveals many examples of images deliberately modified by using variations in a screen's material density. Light passing through translucent organic materials began centuries ago with gourds, ice and fibers and continued through more recent backlit images in fire screens and diaphanoramas. Early moving image systems including Shadow Plays and Phantasmagorias have each used clarity, diffusion and obstruction as part of their creative strategies. Translucency in particular has been utilized by a subset of artists through Expanded Cinema, Installation Art and Media Art. *The Moon Is A Mirror* is a light sculpture that explores both mediated organics and translucency's ability to be both material and discursive surface – looking at and looking through. As more artists and scientists explore touch screen technologies that involve texture, the screen may return as an important layer to the media it presents. The artist will discuss the theory and fabrication of five light sculptures that are multi-layered hybrids of organic and electronic materials as well as situated in both media archaeology and emerging technology.

INTRODUCTION

Every art form began with natural and organic materials as the first creative expressions within every culture used the tools at hand. As the digital proliferation began in earnest in the 1980's, a clearly desperate Kodak advertisement reminded us that even celluloid film was 'animal, vegetable and mineral.' [1] The argument suggested that film's potent mix of wood pulp, ground cattle bones and powdered minerals created a 'warmth' to the image that no digitization could recreate. Questionable in validity, the ad did serve as a reminder that the history of the moving image was based in organic and natural materials as well. The silver screen refers to the early practice of embedding silver into the silk fabric and going further back, projection is only one step from the wood fires, smoke and translucent animal skins and fibers in early performance media systems.

The paper will investigate the addition of layers – either between the light and the image or between the image and the eye. Beginning with examples of nature as a display surface, it will then explore backlit images and rear projection systems to see how the play between transparency and opacity has been used in image creation. Finally, it will present examples from a subset of artworks that deliberately obstructed the image through a range of translucent materials and present a sculptural light installation that references the histories of mediated organics and impeded image.

NATURE AS DISPLAY SURFACE

Natural surfaces were also man's first display surfaces. Recent

findings in Spain and Indonesia confirm that cave walls were the first natural canvases (or at least the ones to survive). The tradition predates even homo sapiens as the first art makers, giving creative expression to Neanderthals. [2] Art through history has used stone, fibers, woods and skins to present images.



Fig. 1. *The Moon Is A Mirror*, 2014, Scott Hessels, steel, translucent organic materials, commercial LEDs, used by permission of the artist.



Fig. 2. *The Moon Is A Mirror*, 2014, Scott Hessels, steel, translucent organic materials, commercial LEDs, used by permission of the artist.

Using natural surfaces as part of a larger, mediated system has been developing over the centuries as well. Recently, even the history of recording was revised when sound waveforms etched into soot-covered paper of French scientist Édouard-Léon Scott de Martinville were finally deciphered and played. These phonautograms were images of sound written with coal dust, not meant for playback. [3] Land Art and the ecological artists have shaped sculptural images from fog, erosion, mist, plants, bacteria and a host of other displays, choosing to "select material based on conceptual, cultural and systemic circumstances of their particular project." [4] Within media art, projecting onto nature is a frequent strategy. Examples include ghosts onto smoke and

trees in Tony Oursler's *The Influence Machine* (2000) and haunting images of Cambodian deities onto trees around Phnom Penh in Clement Briend's *Cambodian Trees* (2012). Usman Hague's *Primal Source* (2008) projected onto water screens and mist; Craig Walsh used a river in *Classification Pending* (2008); Ryoji Ikeda used the sands and waves of Devil's Beach in *The Radar* (2012); Victoria Vesna onto sand in *NanoMandala* (2004) and the Bio-Kino Collective onto cellular tissue in the *The Living Screen* (2008). By placing their images directly onto nature, the meaning of their work is enriched.

Interestingly, a recent artwork in Beijing has chosen to project onto a fake nature. Li Hinghu's *Today's Screening* (2014) uses rhinestones, a deliberate reversal of natural diamonds as a commentary on the changes of value in production of mainland China. He projects old Shawscope cinema onto screens covered with mass-produced plastic crystals, refracting and distributing the cinematic image through the gallery. In his hometown of Dongguan these crystals are a source of livelihood, a reference to a lost skill and an incongruous presence in the dreary industrial context.

SCREENOLOGY

Errki Huhtamo has proposed a hypothetical branch of media studies that discusses the history of screens as "both material realities and discursive entities." [5] He traces the word 'screen' back through history to reveal that it was used to obstruct and protect long before it became a tool to communicate. "The trajectories of screens as realized artifacts and as discursive manifestations do not always coincide. It might be claimed that screens as discursive notions sometimes anticipate their practical realization, although anticipations are not always fulfilled as expected. Seen from such a perspective, "screen" is a complex cultural phenomenon that avoids easy generalization. Media archaeology can help tracing its outlines and its layered historical manifestations." [6]

THE LIGHT BEHIND: THE BACKLIT IMAGE

Gourds and Ice

Before the screen, however, backlighting was used to create the image in a range of contexts and materials. Organic and natural variations appeared in several cultures including gourds and pumpkins in both the east and west being carved to reveal image through layered depths. The origin of the western variation, the Jack o' Lantern, is uncertain, but gourds have been domesticated for over 10,000 years, partially due to their potential for carving. [7] The Maori word for gourd and lampshade are the same and examples of their use as carving depth for lighting effect and pattern date back over 700 years. [8] It is a unique form of folk art in that "It takes an interdisciplinary approach, examining the dynamic interplay between cultural studies, culinary history, ethnography, art history, botany, environmental history and material culture." [9] A variation of light coming through a natural surface has been a winter tradition in northeastern China since the Qing Dynasty (1644-1911). Local fishermen and peasants

formed windproof lanterns from ice by freezing water in buckets and then chiseling a hole for a candle inside. "From then on, people made ice lanterns and put them outside their houses or gave them to children to play with during some of the traditional festivals. Thus the ice lantern began its long history of development. With novel changes and immense advancement in techniques, today we can marvel at the various delicate and artistic ice lanterns on display." [10] Generations of variations have followed, with the tradition and artistry evolving and now a recognized art form with a festival and art exhibition center dedicated to the lanterns. [11]



Fig. 3. *The Moon Is A Mirror*, 2014, Scott Hessels, steel, translucent organic materials, commercial LEDs, used by permission of the artist.



Fig. 4. *The Moon Is A Mirror*, 2014, Scott Hessels, steel, translucent organic materials, commercial LEDs, used by permission of the artist.

Stained Glass Windows

Sheets of glass surface in Roman architecture, but the 12th century saw structural advances that allowed for soaring colored mosaics that used variable thickness and sunlight movement as kinetic design. Stained glass is a fusion of three rocks sand, soda and lime. Color, variable thickness and sunlight movement all create a type of kinetic design. Using certain elements that absorb

light in specific wavelengths within the spectrum, color is not painted or added but created through the obstruction of others in the spectrum passing through. [12] Details within the colored panes were often added with varying thickness and texture of pigment to give different shading techniques to control the light. [13] Over the centuries to follow, new materials and processes emerged including colored enamels that were painted onto the clear glass, essentially ending the era.

Architectural Screens

The first screens began with practical and architectural concerns. The late 16th and 17th century saw a 'Golden Age' of screen painting in Japan. Used as room partitions and backdrops, they were an ideal format for the finest Japanese painters to explore. [14] The rising class of samurai military leaders commissioned works that were loud, brash and celebrated the grandiose tastes that filled their castles. The works included dramatic brushwork and densities, florid colors and intricate gold leaf work to emphasize the play of light between rooms and light sources. [15] In China, an even wider range of materials were integrated into the screen surfaces and inlay was part of the design, a way to vary light density and a demonstration of wealth. Screens were made from reflective mica, crystal and colored glazes while the tessellated work included ivory, jade, enamels, gold and silver. [16]

Firescreens and Diaphanoramas

Erkki Huhtamo's research into the media archaeology of the screen bisects into large and small screens with backlighting appearing in both histories. He points to fire screens ornate Victorian protectors from ash and cinders, as a possible precursor to the more domesticated 'small screen.' By the 18th century the practice of using image collages backlit by the fireplace became common. However, as the primary role was protection and the secondary the display, he is cautious to place these in a specific media history. [17] These screens evolved, however, into more elaborate paintings using a range of materials specifically designed to burst into color (if not flame) when backlit. [18] Diaphanoramas developed as an elaborate art form as pinpoints of light passing through the holes or sections of albumen photograph retouched with watercolours.

Chinese Leaf Art and Lightboxes

Recently, a popular trend in China has spread as a tourist staple. Chinese leaf art, the incredibly intricate sculpting of leaves, would seem to be an ancient use of natural materials as a surface display for imagery but is actually a recent development. Attributed to artist Huang Tai Shang in 1994, "Chinese leaf art symbolizes the universal need for artists to constantly seek new mediums to imprint their skillful images upon." [19] The leaves of the Chinara Tree found in India, Pakistan and China has large leaves that resemble a maple's and a distribution of veins considered ideal for sculpting. Some artists today still work with translucency within the context of layered materials on lightboxes.

Ukrainian installation artist Mark Khaisman uses layers of translucent brown tape on plexiglass – often borrowing from classic cinema iconography. His *You Are Nobody But Escaped Convict* (2006) is an example of an image created using variable translucent density.

THE MOVING SILHOUETTE

Shadow Plays

The Wayang Kulit shadow puppet shows of Indonesia are often cited in media histories for several reasons – the early mediation, the cultural narratives, the performance screen model, etc. However, the materials used for these plays are also notable in projection and display history. Taut linen screens were woven to best display the buffalo leather puppets dancing between them and the coconut oil lamps. [20] "The image literally vibrates on the cloth screen. The puppeteer sits half a meter behind the screen with the lamp placed just above his forehead." [21] In these early media performances, the screen was not only display but also separated the fiction from the dalangs (puppeteers) and musicians. The dalangs used the cloth as an active component of the presentation, varying the closeness or distance and therefore the clarity and focus of the puppets for storytelling effect.

Phantasmagoria

Translucency as a projection tool was used in Phantasmagoria performances, a Western hybrid of sorts between shadow plays and magic lantern shows where 'ghosts' were backlit onto white sheets, gauze or smoke. "The projected images were presented as "apparitions" flying freely through the hall. To achieve this, inventing ways to make the screen semi-transparent – the easiest of which was making it wet – was crucial." [22] These mediated séances used the translucency of the fabric to convey depth, movement and immateriality. In his research on screen etymology, Erkki Huhtamo found the first reference in the 1810 Oxford dictionary for the word screen as part of media culture connected to these performances. The first media screens were not clear or white but translucent.

I CAN SEE CLEARLY NOW: THE TRANSPARENT MOVING IMAGE Duchamp's "Bride"

Transparency that calls attention to itself – clear but not clear – is another variation in the discursive/material distinction within the history of the screen. The painted slides of magic lanterns added color to a clear surface as a method to present images as if hovering in space but were not themselves the artwork. Marcel Duchamp's *Bride Stripped Bare by Her Bachelors, Even* (1923) is groundbreaking for using transparency to look both at and through his work. Pressing lead foil, wires and dust between two panes of glass, the glass was both window and display, its meaning literally hovering in suspension. However, within a few years, cinema would embrace a tabula rasa and anything blocking the image, dust and hair, was blown from the frame.

Celluloid as Object

By the 1950's, the flat, rectangular screens of image projection and display became contested sites. Experimentation occurred within "Expanded Cinema," that is, "an explosion of the frame outward towards immersive, interactive and interconnected forms of culture." [23] Youngblood's defining book insisted that the expansion was not a technological one, but one connected to a globally expanding consciousness caused by new media. "With expansion we cease to think about the screen or the frame and we are instead in the place he describes as 'intermedia,' that is, 'an environment whose elements are suffused in metamorphosis.'" [24]

In Expanded Cinema experiments, the film stock itself became part of the artwork. Different from slides and rear projections, the paints and grease applied by Harry Smith in *Early Abstractions* (1946-57), the dirt in George Landow's Film in *Which there Appear Sprocket Holes, Edge Lettering, Dirt Particles, Etc.* (1966) and the dust in Nam June Paik's *Zen for Film* (1964) included the materials placed onto the celluloid as part of a larger system.

Inarguably one of the greatest media artworks of the 20th century, Stan Brakhage's simple action of placing moth wings, spider webs, leaves and grass onto film has resonated through volumes of media theory, "something that was paradoxically ephemeral and concrete at the same time." [25] *Mothlight* also becomes an interesting study for light being projected through organic materials as the translucent insect wings and plant pieces were collaged between strips of splicing tape. Although the 16mm is projected, there is a component where the wings themselves become the display surface, as the light is interrupted by nature on its way to the screen. Thus the passing of 'content,' in Brakhage's case pure light, through organic materials affects the meaning. "What *Mothlight* gives us, then, is an encounter between geometry and nature and between whatever presumably slower rhythm with which we are used to seeing and the radical, every-frame-is-different pacing of this landmark film." [26]

The Art of Luminous Obstruction

Most examples of backlighting and rear projection generally strove for clarity of image. However, a smaller thread of artworks preferred the deliberate obstruction and diffusion of the moving image. It is strange that the gauzy blocking of the image is a trope in cinema for both horror and pornography, the gaze hindered by a translucent medium, yet it rarely appears in physical form in media systems. The variance from the clarity of transparency, the haunting diffusion of translucency and the negating blockage of opacity all have profound impact on the image and can reveal tremendous beauty.

Surface: Looking at or Looking through

Surface is one of the most considered components in art history. Christa Robbin's 2004 media theory glossary for the University of Chicago is an excellent starting point for considering surface. She traces a complex and contentious history of surface as a

"vacillating plane receding and materializing throughout the history of art." [27] Naturalism caused art's emphasis on surface to recede; modernism celebrated the materiality of media by reemphasizing it. "Surface is central to modernism's rejection of subject matter in favor of form. Fine art's battle against narrative is waged on the surface of paintings." [28] By reconsidering the status of surface, one reinterprets mediation by giving texture a foregrounding impact on the static or moving image. It is understandable that textural painting is experiencing a resurgence "in parallel with the flattening of artistic practice via the print and digital circulation of the mediated art object[...]. This nexus is one of the prime territories to investigate the transition between object and image, particularly in terms of the set relations between the two categories, as we ask whether it might properly be said that an object is "reduced" to an image or whether an image marks a "captured" object." [29]

TRANSLUCENCY AS A CREATIVE STRATEGY

Translucency may be somewhere in that nexus, forcing the viewer to see both the screen's material and discursive qualities simultaneously. Translucent screens from glass or plastics have 'softened' images or provided ghostly effects. Musician and inventor Thomas Wilfred's visual music device Lumia included the 'color organ' clavilux that was dependent on translucency. In the device, light is rear-projected through painted transparent disks onto a translucent screen that softens and distorts. The haunting effect still surfaces in contemporary culture. Wilfred's 1957 *Opus 161* composition can be seen in the first and final scenes of filmmaker Terrence Malick's 2011 film *The Tree of Life*.

Robert Whitman's body of work includes several pieces that are dependent on translucency, projecting on a range of media to create shadow and silhouette, optical illusion and reflection. In particular "a poetic and fugitive phantasmagoria distinguished Whitman's works for theater." [30] His 1964 sculptural trompe l'oeil installation *Shower* rear-projected a woman showering onto a translucent shower curtain. His graphic suite, *Dante's Drawings* from 1974 used semi-translucency as a metaphor for Dante's loss of memory. "Felt as the presence of an absence, more than as an image per se, Whitman's shadow-stains seem to pulsate and elude fixity. By hovering on the brink of visibility, they engender a negative radiance that figures the difficulty of recollection. The fundamental irreconcilability between what is discerned on one side of a sheet of paper and what is spied on the other creates a compelling dilemma analogous to Dante's attempt to convey his vision to his reader." [31]

One of the pioneering works of Expanded Cinema was Jeffrey Shaw's raucous performance projection *Movie Movie* from 1969. In this work, multiple inflated plastics serve as the projection surface allowing for a playground of translucent effects to distort the image. Between a transparent outer membrane and a white inner cone, the space was filled with various materials to bring life to the images – balloons and tubes were inflated, smoke was

released, etc. Here, translucency creates a kinetic and architectonic space of visualization. "The multiple projection surfaces allowed the images to materialize in many layers and the bodies of the performers and then of the audience became part of the cinematic spectacle." [32]

Translucency continues to appear in contemporary arts. Bill Viola's 1995 installation for the Venice Biennale *The Veiling* uses nine translucent fabric scrims hung parallel. At each end, a video is projected, one with a man walking slowly, the other a woman. The illusion is of the two passing through the scrims, meeting in the center and then moving apart. The cloth gradually diffuses the light and the character images lose focus and brightness as they merge together in the center veil. Here translucency and layers become metaphor for the multiplicity of experience and the vague uncertainty of our interactions with another.

Jim Campbell's *Church on Fifth Avenue* from 2001 is a poignant example of the powerful metaphors that are possible within moderated transparency. In the work, a rough grid of lights plays a simple video filmed from church steps of passersby after the 9/11 attacks on New York City. Placed in front of the grid at an angle extruding from the screen is frosted plexiglass. The people moving across the screen in the video are more pixelated in the area where the acrylic is nearest the grid and more fully formed where the acrylic is farther – the pedestrians shift from a discrete representation to a continuous one. The effect is watching people pass to and from a digitized to a more analog version of themselves. In the days after 9/11, the public was reminded of our tenuous mortality and the harsh statistics of death counts. Because of the translucency, the video feels as though we are watching the random living transform into the world of numbers, a powerful and poetic memorial to how one banal, typical day can become infamous.



Fig. 5. *The Moon Is A Mirror*, 2014, Scott Hessels, steel, translucent organic materials, commercial LEDs, used by permission of the artist.

Ken Okiishi's contribution to the 2013 Whitney Biennale *gesture/data* are oil paintings created directly onto flat screen televisions. The video is multi-layered analog and digital footage playing behind sweeping painted strokes on the screen itself, a hybrid of

painting and moving image. Here, translucency conceals but also binds the sweeping/swiping gestures of contemporary screen culture with the techniques of gestural painting into a hybrid form and "reveals a fascination with the translation and migration of meaning and material in a world gone digital." [33]

ABOUT THE ARTWORK

The Moon Is A Mirror is a light sculpture inspired by ice on a windshield, the world outside the car distorted by the layers of frozen snow and rain. As an artist who mixes cinema with emerging technologies, I often focus on the physical properties of generating the moving image and began to consider translucency effects on the image in both history and contemporary media art.

The work was developed concurrently with the *Sustainable Cinema* series of five public sculptures and provided another perspective: cinema created using natural force and displayed using organic materials. In each, cinema's beginnings were reconsidered by designing an alternate history that maintained the original natural power systems and early organic surfaces as if cinema had continued to evolve with sustainable elements instead of being influenced by the industrial and digital ages. Media archaeology and new media art were placed in a new, co-dependent relationship with an active natural environment.

The Moon Is A Mirror contemplates screen origins and translucency as an artistic strategy. I've researched naturally-occurring translucent materials and collected materials from around the world. In this iteration, the screens are made from fur, dove feathers, reptile skin, seeds and seashells. Each was embedded in an organic resin made from Indonesian tree saps. The screens were placed in raw steel frames that suspended them in front of .75 meter commercial LED grids. The LED grids of this type are ubiquitous in Hong Kong, mediating nearly every exterior urban space.

I chose a simple walk cycle, a foundation in the moving image, for the animation. However, I trapped the man in the frame, he paces back and forth across the five LEDs. Each organic material modifies his path differently, diffusing, scattering and blocking the light due to texture, density, color, etc. Nature here, captured and frozen, becomes a type of filter to the animation behind it. Without the video, the screens have a pastoral, delicate, handcrafted quality. However, as the moving image struggles to pass through, the screens become empowered and completely subvert the original meaning of the footage[...] the character seems in between the display and screen, not present on either. The animated man is caught between a digitized media image and a constructed nature.

CLOSING

At or through, the nexus of the surface has raged through art history and as we enter the age of Google and smart glass, transparency is becoming less transparent but a surface for additional display and meaning. Textured, tactile interfaces are also rising in popularity as feeling becomes more closely

connected to vision. The variants of translucency may add another dimension to understanding meaning in the image.

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THE RISE OF HYBRID EXHIBITIONARY SPACES

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ABSTRACT

This paper presents *That's App*, a curatorial project in the form of a locative media experience. Representing the city as an ever-changing assembly of events and exhibitions displayed on a map, this mobile app unfolds hybrid curatorial narratives that users can interact with in digital space and enact in physical space. This paper applies Actor-Network-Theory to trace the formation of a hybrid exhibitionary space through the creation of a curatorial script embodied in *That's App*. Instead of trying to define "what is" a hybrid exhibitionary space I intend to grasp it "along the way," attempting to temporarily capture its actor-network and detect the mechanisms in which it functions. In doing so, I primarily present *That's App* by following its hybrid curatorial narratives as enacted by two potential users in Milan, whom I have named Ann and Andrea.

HYBRID SPACE

At the beginning of the last decade, digital networks – through widespread smartphone and tablet devices – have grown in the direction of mobile technologies. If, at first, the internet spearheaded the concept of drawing together virtual communities distributed in unknown locations, the increase of mobile technologies has turned our attention back to practices taking place in physical spaces. This shift brings with it new implications accredited to location – forging a strong relationship between physical contexts and digital information. The new opportunities afforded by these technological transformations has given rise to what has been defined as "hybrid space" – turning the traditional opposition between the physical and the virtual into an obsolete understanding of space. [1 - 3] Acknowledging the ubiquitousness of these technologies, hybrid space claims a new spatial configuration in which users' everyday interactions can be analyzed. Users not only spend more and more of their time accessing internet, e-mails and social networks, they also do so while they move and act in physical space. Since they never really get offline, this new spatial formation attempts to define users as enactors of a hybrid spatial continuum where interactions that ensue in digital space have simultaneous contexts in physical space.

I will first focus on the concept of space before moving forward with the idea of hybridity. This notion has been defined, discussed and challenged in many different ways and from differing points of view. [4 - 7] Clearly, it is outside the scope of this paper to expansively debate upon ideas of space; however, I would like to briefly underline some relevant positions to provide a theoretical framework of hybrid space as being a collectively constructed entity. In particular, my conception of hybrid space starts from Henry Lefebvre's theory of space set forth in *The Production of Space*. [4] Lefebvre claims that space is socially produced rather than being pre-existent physical spaces. He defines space not as a mathematical entity but through a sociological approach in which

those occupying space generate space, "Social spaces are not material things, but rather a set of social relationships both between objects and objects and people". In particular, Lefebvre identifies three principles or modes of spatial production: representation of space, spatial practice and representational space. Representation of space (or conceived space) means that space might be characterized by the representation that leading groups in society produce to demarcate space. Lefebvre explains this as the space represented by urban planners and designers mostly in the form of maps to denote, for example, a city or the transport network. However, he argues that space is produced in the manifestation of spatial practice (or perceived space) referring to "what users – the enactors of social space – do" or perceive they can do. [8] In this sense, space doesn't precede activities that occur there – it is produced by its users acting in space and conferring affordances to it. Here, affordances are intended as available features that offer potential for action. [9] For instance, the street of a city is collectively considered as such also because its users physically engage with it through practices such as driving, walking, etc.

The third element of the triad is representational or lived space, which is explained as the lived experience of the combination between spatial practices and representation of space; in other words, it is the space of inhabitants and users: "A passively experienced space, which the imagination seeks to change and appropriate". Lived space encompasses the spatial representations which ordinary users make while living their lives, the mental construct with which they approach the physical world. Even though Doreen Massey shows how perceived and lived space are difficult to separate, what interests me is that, in hybrid space, lived experience does not occur solely in the physical, but rather in a type of space that increasingly merges physical and digital domains. [6] Contextualizing the Lefebvrian conception of social space within this new hybrid paradigm, it is conceivable to imply that hybrid space is socially produced and its lived experience occurs through multiple interactions between subjects and objects taking place between online and offline spaces. Simply said, our contemporary lived experience is formed by online interactions simultaneously overlapping and merging with interactions happening in physical space. In my understanding of hybrid space, this idea of interaction is particularly interesting and can be further developed through the conception of social space put forward by Doreen Massey. [6 - 10] Specifically, Jenny Kennedy's interpretation of Massey reveals the significance of space to social interactions occurring through online and offline spaces. [11] "Interactions have a spatial component" and "space is produced in the intersection of interactions." [6,11] In this model, interactions converge and, at the point of convergence, each interaction is shaped and shapes those other interactions it traverses. However,

in hybrid space, because interactions exist both online and offline (and the same interaction often traverses the two spaces) these two domains and their characteristics conflate into each other, as a consequence, changing a user's perception of the physical space that they are inhabiting. Because these convergences are constantly rearranging and reshaping interactions, hybrid space is always, "in a process of being made." [10]



Fig. 1. Karla Black at Galleria Raffaella Cortese.

At this point, I would like to adopt a perspective of "looking from inside" and will seek to "follow the actors" of those interactions that form a hybrid space. In the attempt to do so, I will create a situation between two users, Ann and Andrea, whom I will bring into play. In this scenario, the two users are in Milan and have agreed to meet in the evening at 6:30 for a private view in a gallery. This very specific context will lead, in the second section of this paper, to the introduction of my curatorial practice in hybrid space and will unveil the potential for these hybrid spaces to be reconceived as exhibitionary spatial entities.

May 27th 2014
6.25 pm

Andrea arrives at the gallery five minutes early. While he is walking in through the door, his phone beeps. It's a text from Ann: "I am 10 minutes late. L Sorry! Andrea texts her back: Ok. Dont worry! See you in a bit! J" So, he decides to wait sitting on a bench in the entrance hall where he can unhurriedly read the photocopied

press release that he has just taken from a pile next to his seat. He soon realizes that he is reading about the sculptural objects located just in front of him. So he digs his phone out of his pocket, opens the Instagram app, takes a picture of the sculpture, posts the image on his Instagram profile, "checks in" to the gallery and adds a couple of tags to the image: #contemporaryart #milan #karlablack. The post is also directly published on his Twitter stream, where he quickly adds a quirky comment, which is added to the tags previously included.

Andrea Franceschini

contemplating mesmerizing sculptures connected by a yellow powder line while waiting for @AnnSmith[...] as always! J #contemporaryart #milan #karlablack at Galleria Raffaella Cortese

Ann finally arrives at the gallery; they greet each other with a hug and a kiss on each cheek.

The narrative unit described above is the hybrid space produced in the intersections between online and offline interactions – that which Kennedy has identified as networked space. [11] Instead of analyzing each contextual element individually, risking a perpetuation of the online and offline dichotomy, the aim is to frame and comprehend the dynamic between the actors involved in this situation as intertwining interactions. Therefore, the attempt is to take into account both the physical presence of Andrea sitting on a bench while reading a press release and his digital interactions on Twitter and Instagram; he is multi-tasking in a series of asynchronous interactions by both texting and posting an image of the installation he has just captured with his smartphone. In doing so, I would like to demonstrate how Andrea's lived experience produces hybrid space. To this purpose I will apply, Actor-Network-Theory (abbreviated ANT), a social theory mainly developed by Bruno Latour, Michel Callon and John Law which offers a method to grasp hybrid space in its mode of being.

ACTOR-NETWORK-THEORY

ANT seeks to, "make relations the determinative factor in what entities are." [12] In this context, I will report two characteristics of ANT that are most relevant to the purpose of this paper. First, even though the term "network" might intrinsically convey that what is outlined in ANT takes the shape of a network, it is not necessarily the case. Latour explains that ANT "is a method to describe the deployment of associations like semiotics is a method to describe the generative path of any narration. It does not say anything about the shape of entities and actions." [13] This principle allows a network evaluation to be applied to a social situation even though it does not take the form of a network in any way. Therefore, not surprisingly, I use ANT as a method to account for the interactions amongst Andrea, Ann and the other things involved – attempting to grip the intersection of their interactions and how they modify space. This introduces the second characteristic of ANT that is functional to hybrid space. Latour calls a good ANT account "a

narrative or a description or a proposition where all actors do something and don't just sit there." [14]

In ANT, anything can be considered an actor. Law describes ANT as a "relational and process-oriented sociology that treats agents organizations and devices as interactive effects." [15] In other words, in an actor-network, the same analytical framework is employed to describe humans, a text, an idea or a machine. To go back to the scenario above, there is a clear interaction between Andrea and the press release and ANT would account for this interaction and present the press release as a source of action. It is a matter of fact that the press release plays the role of a mediator between Andrea and the exhibition that he physically inhabits. The press release functions as a script creating immaterial, but conceptually strong, multiple interactions between the artworks presented in the gallery through a curatorial narrative. Still, it also seeks to engage its reader, Andrea. If the press release accomplishes its job, the exhibition would exist not only as a strong curatorial entity, but Andrea would also engage with it in a potentially very active mode – becoming an operative node in the actor-network of the exhibition. In the next section, I will demonstrate how Andrea will act.

In the meanwhile, Andrea also receives a text from Ann, who is running slightly late to the appointment, to which he quickly replies with a text to reassure his friend.

Ann: "I'm 10 mins late. L Sorry!"

Andrea: "Ok. Don't worry! I See you in a bit!"

In the above actor-network, each smartphone can be inserted as an actor – a mediator – between Andrea and Ann that allows them to interact even though they do not share the same contiguous physical place. Their interaction happens thanks to the capabilities of their mobile devices to send and receive text messages while being in movement. An actor-network could also establish that this interaction is occurring through a type of communication that is mediated by their own mobile devices with their own keyboards, displays, chat-bubbles, emoticons, etc. and that it takes place thanks to a cellular network provided by mobile phone operators. Yet this actor-network could potentially become unbearably complicated, accounting for an endless number of technological constituents (from masts, cables, electro-magnetic frequencies, routers, software, etc.) each somehow contributing to the text communication between Ann and Andrea. However, in my actor-network I am willing to include solely those actors that serve myself to demonstrate hybrid space as a socially produced entity.

In this sense, ANT implies a "type of connection between things that are not themselves social" – such as a smartphone or a mobile phone operator – but that they are enacting a hybrid space in which a text message is carrying a type of information that leads Andrea to comfortably sit on the bench and read the press release. [14] Still, this action of reading, possibly instigated by Ann's text, contributes to the moment in which Andrea stops to appreciate

the series of sculptures just in front of him, in turn, leading him to take an image of it to share on Twitter and Instagram.

HYBRID EXHIBITIONARY SPACE

Choosing to scrutinize this last action, we realize that Andrea is not only enacting and inhabiting a hybrid space but is also active in extending the exhibition outside of its own physical space. In other words, Andrea, interacting with the sculptural objects through his phone, which is set up with a camera, connected and integrated to an endless number of social networks available online, is extending the physical exhibitionary space of this series of sculptures from the physical space of the gallery to the space of the Internet. His lived experience in the physical exhibitionary space, contextualized in a complex network of connected technological devices, has produced new spatial possibilities for these sculptures to exist. With the simple image uploaded to platforms on the Internet, Andrea has transformed the physical exhibitionary space that he bodily inhabits into a hybrid exhibitionary space that will quickly expand not only spatially through re-tweets, re-blogs, favorites, accompanying selfies, run through twitter streams, appear in posts, likes and by word-of-mouth, but also temporally as they will be experienced by other users in different points in time. In this actor-network, Andrea becomes one of the many nodes through which the exhibition grows and disperses. [16] Indeed, these sculptures are no longer just part of the physical installation in front of Andrea; they "duplicate" in an image of themselves, which starts to flow through the Internet. By clicking on the hash tag #KarlaBlack, a stream of information about the artist Karla Black gathers together in endless lists of comments and images.

Andrea Franceschini

..contemplating mesmerizing sculptures connected by a yellow powder line while waiting for @AnnSmith[...] as always! J #thatscontemporary #contemporaryart #milan #karlablack at Galleria Raffaella Cortese

Davide Tronzano @David5465 May 11th

*#KarlaBlack you got me #modernart gallery
{ form + antiform }
artist inspiration:
materials used: sugar paper*

Art * Texts * Pics @atpdiary May 11th

*Interview with the artist
#KarlaBlack @RaffaellaCortese*

Sarah Batsche @sarah-1984 May 5th

*10 artists announced #KarlaBlack
#studiovoltairealumni #NicoleEisenman
#HenryOlesen*

The image is not only open to comments and re-tweets, it is also linked, through hash-tags, to other works, exhibitions and galleries,

eventually taking part and contributing to an enlarged exhibitionary space that is distributed. In this sense, the exhibitionary space becomes indistinguishable from its network of distribution in which the exhibition itself circulates. The exhibition opens up to a space of informational flows allowing for the creation of an exhibitionary space that is simultaneously inhabited by different users without territorial contiguity. [7] In the space of flows, Andrea is one of the many users fabricating and continuously enlarging an exhibitionary space that does not comprise merely of the exhibition at Raffaella Cortese Gallery in Milan but that contains as much as it links to. Consequently, the more users, the more interactions, the more networked the exhibitionary space is, the wider it becomes. In this sense, at the level of image at least, all exhibitions are online exhibitions as much as they are physical. Artist Katja Novitskova in a group interview argues that “the network effects of actual art installations and shows are not happening directly in the gallery but rather online in the form of documentation shots, re-blogs, likes and other forms of distributed attention. I think all art that has been shared online becomes “Internet Art” on a basic image level.” [17] In the same interview, artist John Kelsey says, “I don’t see much of a distinction between gallery space and social media space. Don’t contemporary objects and their makers move in both spaces simultaneously? The work we do and the way we do it is what causes these spaces to merge and overlap.” [17]

Certainly, from a physical dimension to an online one, the exhibition is unquestionably hybrid. Andrea taking a picture of the exhibition installation is triggered in a physical space and the exhibition does expand thanks to a technological infrastructure that has a physical presence and that is enacted through users placed in physical locations. However, what I am interested in is to invert this direction: instead of bringing the exhibition from a physical exhibitionary space to a digital exhibitionary one, I would like to reflect on how a hybrid exhibitionary space might be generated using an online curatorial practice as a starting point. This means, borrowing Castells terminologies, connecting the “space of flows” to the “space of places” in a way that flows of information motivate interactions in physical locations. [7] Obviously, reverting this process becomes particularly meaningful in the presence of mobile technologies, which are designed for navigating physical spaces using a digital tool. My interest in these technological opportunities is entangled from a curatorial point of view.

My current practice-based research attempts to understand the potential for curatorial practice to generate hybrid exhibitionary space and overcome the neat separation between the curator working in physical space and the digital curator dealing with information and technological networks. By doing so, I have conceived and developed a curatorial mobile app called *That’s App*¹, which links contemporary art events and exhibitions in Milan. It is currently available on App Store² and Google Store³. *That’s App* has been produced with curator Giulia Restifo, graphic designer Andrea Amato and software developer Luca Corti as a part of the curatorial project that’s contemporary. It was released

in April 2013 for iOS. An Android version was developed in October 2013 with the collaboration of software developer Stefano Fattorusso. Representing the city as an ever-changing assembly of events and exhibitions displayed on a map, *That’s App* creates a type of exhibition that dwells between the app and the city. It unfolds what I will refer to as “curatorial narratives” that users are expected to interact with in digital space and enact in physical space. It is in this sense that I have tried to reverse the process of hybridization of space: instead of looking at the user bringing the exhibition outside of its physical exhibitionary space, the attention shifts on the user being brought into the exhibition from a digital experience. However, in *That’s App*, the experience of one exhibition is extended to the overall experience of the city. From this perspective, the city is the exhibition that exists virtually in the digital dimension of the mobile app and physically through the usages that users make of it in physical space. In this sense, the exhibition is hybrid from its conception. To better demonstrate my argument, I would like to pause to develop the concept of (hybrid) curatorial narratives.

CURATORIAL NARRATIVES

My interpretation of narratives comes from ANT: an actor-network is a narrative describing any interaction between actors. [14] Besides this, in accordance with the ANT principle of generalized symmetry, a narrative is any interaction that can occur between human actors, between human actors and non-human actors and between non-human actors. [13] As a consequence, going back to our scenario, narrative is Andrea (human) reading a text (non-human) on his phone (non-human); but also the series of sculptures (non-human) interacting with the camera (non-human) when Andrea takes a picture (non-human). To reiterate my line of thought, a narrative embodies an interaction between actors that can be human or non-human actors. Interactions create space. Therefore, not only is space collectively created by interactions among users and things, but we can also infer that accounting for many interactions means to delineate a narrative space. As a matter of fact, narrative space describes the very principle of what an exhibition is. [18] We can conclude that, this type of exhibition is made out of curatorial narratives that, like other narratives, are formed by the interactions among human and non-human actors between online and offline spaces. Now, I am left with defining what makes a narrative “curatorial;” indeed, not all narratives are supposed to be curatorial. The difference is that curatorial narratives imply a curatorial agenda behind them. They come from a previously planned “curatorial script” that embodies a program of potential interactions to be enacted by users. In *That’s App* the curatorial agenda is to stimulate users to make their own exhibitionary experience of the city. The curatorial script is encapsulated in *That’s App* through suggested spatial and temporal trajectories and proffered affordances that are expected to be enacted by users in physical space. However, there are two dimensions that need to be considered in order to better understand the curatorial aspect in the construction of these narratives. The first one is the digital interface of *That’s App*, which

provides users potential narratives of the city. *That's App* was initiated with the mental image of a constellation. Nicolas Bourriaud defines the idea of archipelago or constellation as a recognizable pattern and an abstract assembly. [19] In *That's App* this constellation takes the form of a distributed exhibitionary space constituted by a multitude of art events and exhibitions. And yet, represented as an abstract map, *That's App* aims to function as script with different routes and movements to be enacted. The creation of these narratives have implied a curatorial process of selection, filtering and clustering of events and exhibitions that have gathered together a transversal assembly of artistic practice and organizations⁴.

At this level, the curatorial element resides in a system of affiliation addressed to a specific selection of spaces and practices – from esteemed non-profit organizations, to temporary artist-run spaces and practices. This horizontal type of association allows *That's App* to provide a voice also for those often under-represented practices that form the grassroots of visual arts in Milan. Events and exhibitions are curatorially threaded together through a time/space structure in which they are marked on a map through dot indicators that change color and size in relation to the positioning of the event in time. A series of original content outputs in the form of short reviews are also added to offer a curatorial context around selected events and exhibitions. Here, the construction of the distributed exhibition happens at the level of perception, indicating what users – the potential enactors of the hybrid exhibitionary space – perceive they can do in physical space. Instead of curating artworks, it is the informational context around them that has been researched and put together creating a series of possible spatial and temporal trajectories to be lived digitally and physically.

This last aspect blurs with the second dimension – the focus of this paper – considers the usages of these narratives made by users in physical space. At this point, narratives exemplify the Lefebvrian lived experience dwelling between a “representation of space” in the mobile app and the “spatial practices” of the users inhabiting the city and its galleries. At this level, the curatorial resides in the process of triggering interactions in physical space, such as walking, seeing, discussing; but also interactions such as sharing and commenting that, reversing the process once more, bring the exhibitionary experience in the space of flows.

In the next section, I intend to grasp these curatorial narratives along the way as enacted by Ann and Andrea using *That's App*. Bringing the two users back in time, the following scenario traces an actor-network of how the two users agreed to meet at Raffaella Cortese Gallery at 6.30 pm.

May 27th 2014

11.35 am

Andrea from his office texts Ann:

“Let's visit an exhibition after work. Know anything interesting to see? Any PV's?”

Ann's phone – on the other side of Milan – beeps. Ann takes out her iPhone and reads the text. She would be really excited to visit an exhibition but during the last few weeks, she has been so busy that she does not know what is on. From the main menu on her phone, Ann accesses *That's App* homepage, which is a map-type interface. She starts to navigate through the map scrolling her finger up and down on the touch-screen. Ann spots a couple of pink dots – meaning that something is happening today⁵. She taps on both dots to see if there is an exhibition she might like to see. Ann decides to suggest to Andrea to meet at Raffaella Cortese for the Karla Black solo-show, which is even quite close to her office. She taps on the icon “share” and the Apple standard pop-up menu comes up. The window provides the options to share Karla Black's private view with Facebook, Twitter, email or text. Ann decides to email Andrea and, therefore, taps on the icon “email” and the app re-directs Ann to the mail app on her phone. An email window appears containing an automatic message:

Hello,

*I found Karla Black at Raffaella Cortese
on that's contemporary via That's App!
Do you want to go with me?*

<https://www.thatstemporary.com/event/9819>

Karla Black

28th May – 13th Sep 2014

Private view: 27th May, 6 pm

@Raffaella Cortese

*Via Alessandro Stradella 1,
20129 Milano*

Tue - Sat

3 – 7.30 pm and by appointment

Sent from my iPhone

Once Andrea receives the email, his phone beeps to inform him there is a new email to read.

Subject: Karla Black at Raffaella Cortese

Sent by Ann Smith

While reading the email, he clicks on the link included in the email that sends him directly to the event profile on *that's contemporary* website. Andrea quite likes the exhibition and emails back to Ann:

Andrea: “Great! See you in front of the gallery at 6.30”

Ann: “Ok, See you there! x x x”

In this brief sketch, Andrea and Ann dispatch roles, appointments and performances in a space and time trajectory. As Latour would phrase it, they produce a type of novelty: with their texts, Ann and Andrea approved a quasi-contract with the phone equivalent of a

handshake. [20] They are tied up into a script that will assure that the two will more or less follow it and meet at 6.30 pm in front of the gallery in Via Stradella 1. In particular, their agreement in meeting at 6.30 pm has been made with the instructions dispatched by *That's App*, which provides Andrea and Ann with a series of selected event and exhibition choices and, once they choose, they are also afforded with the all practical information they require to reach the gallery, on the right date and place. If the information were wrong they would have been sent to another part of the city or if that exhibition had been missing from the mobile app, Andrea and Ann might have chosen to see another exhibition or they would have gone to the cinema or met another day.

The combination between their agreements and the mobile app instructions led Andrea and Ann to bind themselves to a program of actions – what I have called a curatorial script – that delegates different trajectories to which users assign their own affordances. Then when the script, which they have agreed to, is performed – so that Ann and Andrea will reach the gallery more or less at 6.30 – affordances will turn into physical interactions. What was just a representation in the mobile app will be “translated” in a type of embodied novelty taking place in physical space. [14] In this sense, *That's App* plays the role of the mediator between the city and its users. However, it is just one of the many actors mediating Ann and Andrea's experience.

Andrea and Ann have been enabled to meet also through the technological devices that work as delegates of action. Any actions have of course been made by Andrea and Ann; but also by their phones, emails and applications on each other's phones. These technological delegates enable, permit and authorize Ann and Andrea to get to know, share, visit, reach and talk about this particular exhibition - allowing the hybrid exhibitionary space itself to come into being.

Beatrice von Bismark has defined exhibitionary practice as taking the form of a constellation by combining things that haven't been connected before: artworks, artifacts, information, people, sites, contexts and resources. [21] Within this heterogeneous arena, the curatorial is defined as the “dynamic field where the constellational condition comes into being.” In *That's App* this constellation – or dynamic field – is the city enacted by a heterogonous engineering – a type of distributed ability to associate artworks, places and technological and human behaviors. Ultimately, not only users but also technological delegates are co-producers of the hybrid exhibitionary space. However, this hybrid exhibition – that nevertheless is targeted to be experienced by humans – provides users with a curatorial tool that allows them to play an active role in their experience of the exhibitionary city as way-finders and narrative-enactors ultimately becoming co-producers of their own curatorial narratives. The process of conceiving *That's App* mainly resulted in formulating a type of “open work” – an unstable field of options that prompts users towards a series of varying experiences. [22]

CONCLUSION

In this paper, I aimed to illustrate first of all how *That's App* creates a type of hybrid exhibition through the creation of curatorial narratives unfolding from the digital space of the app to the real space of the city. With this purpose, the actor-network served to unveil the curatorial script embodied in *That's App* and enacted by Andrea and Ann in their experience of Milan – thus giving rise to the hybrid exhibitionary space.

Second, by following the path of delegations of the actor-network instead of its components, I wanted to show how this exhibitionary formation is not only spread but also shared with many other technologies to the point that, as Latour said, “reflecting on it means to study a field of forces and transfers of delegations” through a collective of distributed actors. Indeed, the actor-network portrays a story where a mobile app is no more embedded in Ann and Andrea's hybrid exhibitionary experience than they are embedded in a network of technological devices and physical settings. [20]

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ENDNOTES

1. That's App is the mobile version of the online platform www.thatscontemporary.com developed between 2011 and 2013. That's App has extended the capabilities of the web platform towards mobile technologies.
2. That's App for iOS on Apple Store. Accessed October 20, 2014. <https://itunes.apple.com/app/thats-app/id624341746?mt=8&ign-mpt=uo%3D4>
3. That's App for Android on Google Store. Accessed October 20, 2014. <https://play.google.com/store/apps/details?id=com.thatscontemporary.android.thatsapp>
4. The selection criteria has been inspired by Anthony Huberman's essay, "Take Care" (2011) who proposes a set of instructions for a contemporary ethic of curatorial behavior inspired by the ten-point manifesto by Swiss artists Peter Fischli and David Weiss, *How To Work Better* (1991).
5. In That's App, a yellow dot indicates that an exhibition is upcoming. The dot becomes pink on the day of its private views and then blue until the end of the exhibition. Then, it will disappear from the homepage and the exhibition will be archived in the gallery profile presents in the section Place.

THE USE OF MICROSCOPIC IMAGES TO DESIGN RANDOMIC TATTOOS

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ABSTRACT

This article presents and discusses the process “bio-inspired tattoos,” e.g., biologically inspired tattoos created as randomly generated images with visual patterns inspired by neural stem cell cultures. It can be summarized as follows: (i) in vitro cell cultures are cultivated; (ii) images of the cultured cells are taken; (iii) the visual patterns of the cell cultures taken in (ii) are analyzed and translated into a sketch to be used as a tattoo design; and (iv) the sketch of phase (iii) is transferred to skin as a randomic based tattoo art. As processual images which present structural unpredictability these tattoos allow the exploration of the active role of random in tattooing. Here we introduce and present the process of tattoo images based on dynamic biological systems.

INTRODUCTION

The exploration of tattooing as a language is directly related to the process of creation of the image to be engraved into skin. Its traditional process is similar to a concept design in which the professional (tattoo artist) seeks maximum control of the results into the skin. In the other hand the exploration of tattooing in terms of new technologies and processes is incipient. This article presents the development of a new project: “bio-inspired tattoos,” e.g., biologically inspired tattoos created as randomly generated images with visual patterns inspired by neural stem cell cultures. During the process in vitro cell cultures are cultivated and images of the cultured cells are taken. The visual patterns of the cell cultures are analyzed and translated into a sketch to be used as a tattoo concept and this sketch is transferred to skin as a randomic based tattoo art. The protocols of the cells’ culture phase are mainly based on a sequence of washes and an incubation with primary and secondary antibodies that reveals the shape of the desired structure. This processual image presents structural unpredictability allowing the exploration of the active role of random in tattooing. Neither the tattoo artist nor its user choose a specific image. Here we introduce the concept of tattooing based on dynamic biological systems.

Introduction

Before starting any discussion about the bio-inspired tattoos it is necessary to introduce and present the tattoo procedure highlighting the organic response to the ink and how this organic process is important in tattooing.

Tattoo Procedure

In a simplified form, a tattoo is a skin intervention performed through micro perforations that can be done with sharp materials such as bones, animal teeth, pieces of wood and metal needles. [2] The small variation of these materials and methods related to the practice makes clear that the procedure of inserting ink into the skin remains almost the same during the history of tattooing.

After the invention of the electric tattoo machine patented by Samuel O'Reilly in 1891, considerable changes in tattooing were made. However, for over a hundred years the device for performing tattoos has remained essentially the same. [1][2] The difference is that instead of using the hand to perform the up and down movement to insert the needle in the skin, with the electric machine this movement is totally mechanical.

During the tattoo procedure, the needle penetrates the skin at an ideal depth that varies depending on the body part at a value of 1.5 mm to 3 mm. If the ink is inserted in the surface layer or epidermis, it is expelled during the skin renewal process and if it is deposited in deeper layers or subcutis, it is possible to be dissolved in the bloodstream (Fig. 1). The ink is inserted into the dermis, the second layer of the skin and it is not expelled because of a typical inflammatory response of the human organism to a foreign body. With the insertion of the ink, the skin starts a process of inflammatory reactions and necrosis followed by the presence of ink inside fibroblasts.[3] The tattoo “causes micro tissue damages and the body start to produce endogenous substances aimed at its cellular and tissue restoration.” [4]

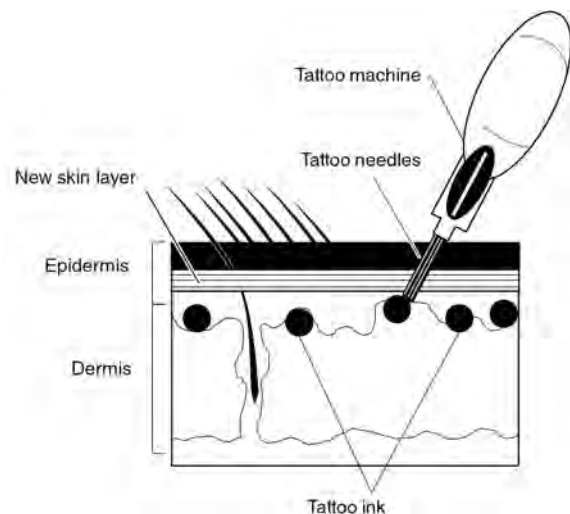


Fig. 1. Insertion of the ink in the skin. Adapted by Breno Bitarello. (Source: How tattoos work: <http://tinyurl.com/7jfwob>).

The intradermal process can be summarized as follows: although the skin intensely renews itself due to the constant cell replacement, it does not absorb the pigments because they are in the dermis surrounded by a network of fibroblasts and collagen. Each fibroblast is surrounded by a conjunctive tissue prominent network that holds and immobilizes the cell. The elimination of the pigment particles is prevented due to the restoration of the basal intact membrane (interface between cells and supporting tissues). [3], [4]

This intradermal process of tattoo ink emphasizes the active role of random during the healing period of the body. Factors such as cell and tissue regeneration affect the healing process and the result of the image on the skin. Thus, it is evident that even seeking full control of the process where the resulting image on the skin should be exactly equal to the concept developed by the tattoo artist, the artist can not accurately predict the organic variables involved. This active role of random can be highlighted in artistic projects, where the tattoo establishes itself as an image in process resulting from factors such as self-organization.

Tattoo and Microscopic Images of Cell Cultures

In order to develop the project bio-inspired tattoos we used technologies and processes from cell biology. As artists do not have the necessary knowledge to work with cell manipulation, the whole work was made possible due to an established collaboration with neurophysiology researchers. The laboratory phase is presented next.

Culturing Neural Stem Cells

All procedures described were approved by the Animal Care and Ethics Committee of Universidade Federal de São Paulo (Federal University of São Paulo) and were part of Neurophysiology laboratory projects. The first purpose of these images is the observation of migration pattern and analysis of differentiation of neural stem cells. Stem cells from the telencephalic vesicles of mouse embryos (E14) were extracted and cultured as floating neurospheres for 7 days. Neurospheres are heterogeneous cell aggregates derived from a single stem cell that by asymmetric division give rise to another stem cell and also a progenitor cell. The neurospheres correspond to aggregates formed by neural stem cells and progenitor cells. [5]

The culture media used in the phase of proliferation of neurospheres was composed by DMEM/F-12, 2 mM L-glutamine, 20 ng/ml of FGF-2 (fibroblast growth factor – 2), 20 ng/ml of EGF (epidermal growth factor), 2% PSA (penicillin/streptomycin/ antifungic solution) and 2% N2 supplement at 37 °C in 95% humidity and 5% CO₂. To study migration and differentiation, coverslips were coated with poly-L-lysine solution, washed with MilliQ water, dried in the laminar flux chapel; 30µL of laminin was added to coverslips and incubated for 30 minutes at 37 °C and then washed with DMEM-F12. In order to allow the differentiation, neurospheres were plated onto coverslips and cultured in differentiation medium (without growth factors) composed by DMEM/F-12, 2 mM L-glutamine, 2% PSA and 2% N2 at 37 °C in 95% for 7 to 10 days.

During the proliferation and differentiation processes, some images were taken using light microscopy to evaluate the growth and the rate of migration respectively. To obtain these images, no special procedure for staining is necessary since the intention is just analyze the morphology of the cells. After in vitro differentiation, the neurospheres, neurons, oligodendrocytes and neural

precursors arose from neurospheres and to analyze cell-fate determination is necessary to label the cells with specific markers using the immunofluorescence technique. Immunofluorescence was performed in plated neurospheres previously fixed in 4% of paraformaldehyde (PFA) and blocked/permeabilized in 1% BSA (bovine serum albumin)/ 0.01% Triton for 30 minutes. Primary antibodies against Nestin (1:500, Chemicon) and GFAP (1:1000, Dako) markers of neural precursors and astrocytes respectively were incubated in PBS solution at 4°C for 1 hour. After washing with PBS, the cells were incubated in secondary antibodies Alexa 488 or Alexa 546 (1:600, Molecular Probes) for 30 minutes. After washing with PBS, DAPI solution (1:10000, Sigma) used as nuclear staining it was incubated for 10 minutes. Images were taken in a Nikon microscope at different magnifications (shown in the subtitles) (Fig. 2).

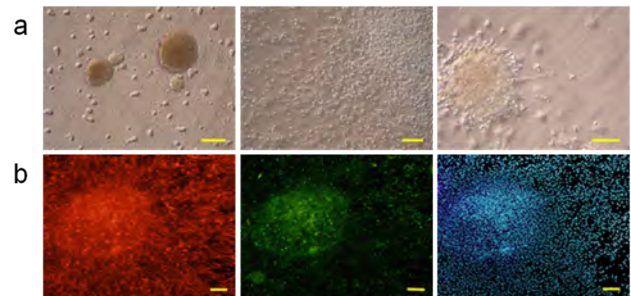


Fig. 2. (a) From left to right, light microscope: Cells cultured as floating neurospheres (magnification 200x), differentiation of neurospheres (magnification 200x) and higher magnification showing neuron morphology (400x). (b) From left to right, fluorescence microscope: GFAP+ (red) and Nestin+ (green) showing the astrocytes, neural precursors. The nuclei were stained with DAPI (blue) (magnification 200x). Calibration bar: 100µm.

Biologically Inspired Tattoos

Bio-inspired tattooing is a process of creation of abstract tattoos based on autonomous systems. The focus here is not only the end result on skin, but the entire process. Although the method to insert the ink in the skin is the same as conventional tattoos, bio-inspired tattoos differ from these tattoos in which what will be tattooed on the customer is governed by his choice and not by the tattooist. The common procedure in tattooing is closer to a development of a craft: the customer chooses an image and this image is tattooed on his skin by the tattooist. In the case of bio-inspired tattoos, the user (canvas/tattoo user) acts as a collaborator. He does not choose what will be tattooed on him. It is not about buying a pre-determined or chosen image that will be transferred to his skin, but to be opened to what is proposed by the tattoo artist in his creative process. The artist acts by transforming and translating the images in each step of the process from nature (cell cultures, translated into photos, photos translated into drawings, drawings translated into paintings that are translated into tattoos) to its application to the body, which in its turn will be in constant change until their utter destruction (death).

Due to its dynamic, the whole process of bio-inspired tattoos is opened to the interference of random, however, due to the role of the artist, we can speak here of controlled random. In other words, the process itself generates opportunities and outcomes which are not intended and planned by the artist, but that would end up being incorporated into the process by the artist. Despite these interferences, the potential of the process of creation of bio-inspired tattoos is in the fact that the whole process, although opened to contamination and interference, be planned, designed and governed by the tattoo artist, who acts as a conductor of contaminant variables.

These tattoos are meant to compose the body following its fluidity and anatomy. The bio-inspired tattoos are supposed to be seen as a process focused on understanding both the specifics of tattooing and the human body and consequently the behaviors of the materials used during the process. Each tattoo is designed to fit a specific body part of a specific person. Factors such as fit and flow as well as depth and readability (the tattoo overall must be visible when seen from a distance) are crucial in the process.

Bio-inspired tattoos

Earlier steps of the concept and process of creation of the cell inspired biotattoos include the development of tattoos based on natural forms like trees (Fig. 3) and plant tissues like xylem and phloem (Fig. 4). As cells are micro structures self organized in a way to form something in a macro scale such as a limb or a tree for example, this step of the process was planned to make clear that the use and organization of visual small structures to achieve an overall sense of fluidity would be explored on a tattoo concept. In this way subsequent tests were started with the translation of images of cultured cells to pencil sketches and digital paintings (Fig. 5) that could be transferred to the body as a tattoo design.

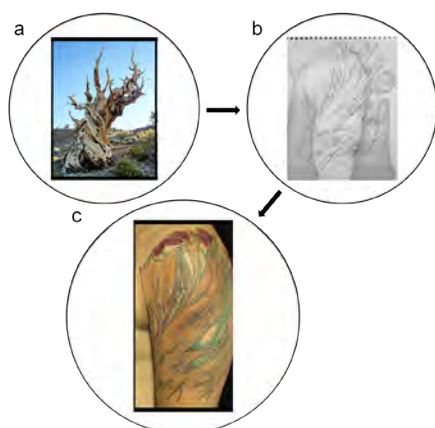


Fig. 3. Early steps of bio-inspired tattoos, tattoo (c) based on an ancient bristlecone tree (a) was adapted from a sketch (b). Source: (a) <http://tinyurl.com/kt68gsp>. and (b) and (c) by Breno Bitarello.

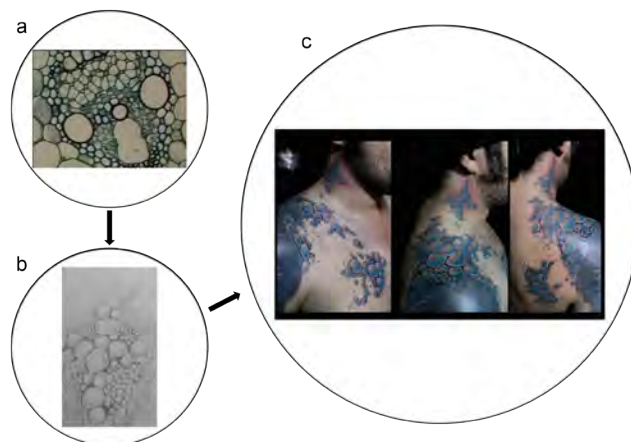


Fig. 4. Early step of bio-inspired tattoo based on plant tissue where (a) is a photomicrograph of xylem and phloem (plant tissues), (b) sketch of (a) and (c) translation of (b) to (a) adapted to the skin. Source: (a) <http://tinyurl.com/ldyksuj> and (b) and (c) by Breno Bitarello.

Instead of using images found on the internet, books etc., the collaboration with scientists made it possible to build and prepare the references and also to have an archive with photos of the culture cells. In this way the artist would choose and manipulate the references freely. The option for micro structures is due to the fact that as the body is formed by self organized micro structures, it is possible that visual images such as drawings, paintings and tattoos of course, would be planned and conceived as macro structures formed by artistic organization of bio inspired micro structures. In other words, instead of self-organizing images, these images are created by the artist who organizes visual structures in a way to achieve an anatomical overall flowing structure by manipulating the materials and being aware of its specific properties. On the other hand, when the tattoo procedure begins a wide variety of bodily reactions starts. In this way, it is common to see many differences between the tattoo after its transference to skin and the same tattoo after the healing process. Also, since the body reacts to sun, food etc. as time passes some variations can be seen in the tattoo (Fig.6).

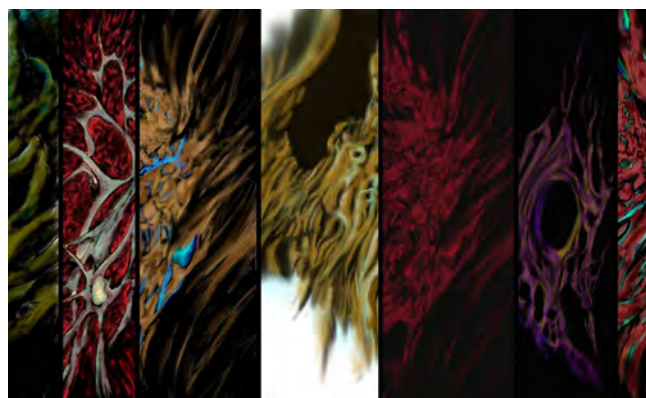


Fig. 5. Digital paintings based on cultured cells. Images by Breno Bitarello.

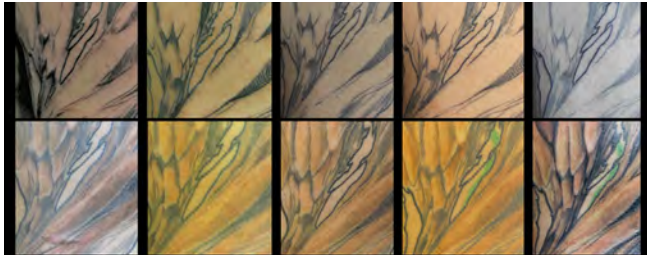


Fig. 6. Variations in the same part of a tattoo. Photos taken in a period of two years. Images by Breno Bitarello.

Research involving cell cultures were developed as follows: neural cell cultures *in vitro* were labeled by *immunocytochemistry*. The *immunocytochemical* reveals a visual pattern generated by the random interactions of the cell culture system. During this process, the self-organizing properties of these living material and its were observed and its stages of organization photographed. These pictures were translated in to sketches, paintings and then to human tattoos (Fig. 7).

Since there are many variables involved in, the bio-inspired tattoos require a complex and long process of creation. Initially it is necessary to perform the cell cultures and capture their images. Only part of several captured images are used for the production of the sketches. When selecting the images the focus is the organization of the cells. The way the cells are placed in the picture is essential in the process of translating these images into drawings and consequently in tattoos. The captured image has to fit the structure of the human body. It involves analyzing if the composition of the photographic image is harmonic to a particular part of the body. In this way, the image needs to function not only as photography, but also as drawing, digital painting and tattoo. Also each medium has its own properties and behaviors. An image designed for paper, canvas or screen (digital) surfaces does not necessarily fit on the skin. Unlike these mediums, the skin is presented as a three-dimensional surface with its specific properties (cell replacement, regeneration, metabolism, volume, elasticity etc.).

Moreover, it is necessary to consider the specifics of each part of the body which varies according to muscle morphology and anatomy. The physical structure of the arm is different from the leg, ribs, back and so on. During the process the importance of how the image will fit the chosen body region and how it flows on the body are the main factors that would be considered a specific property of tattooing. What the famous American tattoo artist Guy Aitchison calls fit and flow are, according to him: two sides of the same coin. [1] The development of these tattoos produces new forms of qualitative properties in tattoos. Both the final result of the tattoo and its process of creation are taken into account. One of the main properties of the bio-inspired tattoos is related to the active role of random. Once the tattoo artist works in a translation and adaptation of the images from one media to

another (photography/drawing/digital painting/skin) we can talk about controlled random.

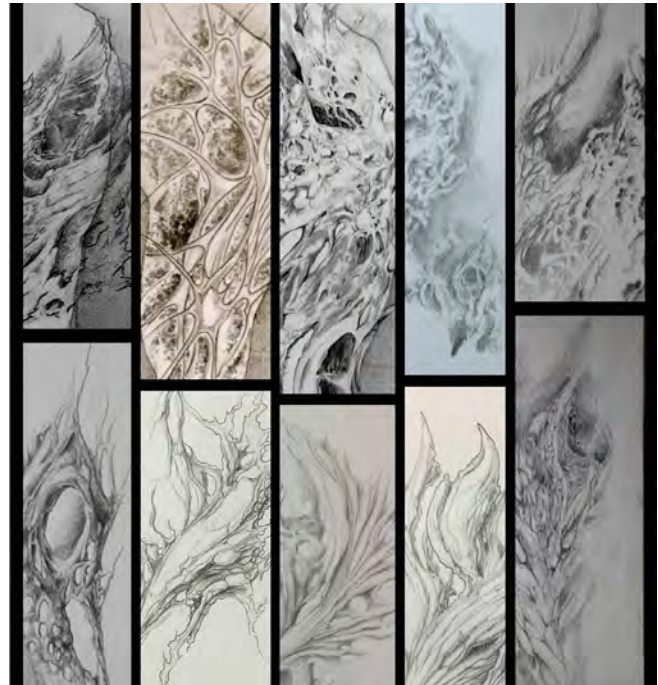


Fig. 7. Digital paintings based on cultured cells. Images by Breno Bitarello.

CONCLUSION

In this paper we described the development of bio-inspired tattoos that presents a new concept of tattoos based on abstract images generated by the self-organization of living systems. The use of natural references when designing a tattoo is not new; however, what highlights the uniqueness of the bio-inspired tattoos is not only its final result (on the skin), but the whole process of creation and the translations and adaptations of the initial reference image. The development of processual images allows new language and technology explorations both for art and tattooing. In subsequent works we will explore the relationships between the bio-inspired tattoos and the use of biology in arts, in specific, how contemporary artists use tattoos in artistic projects.

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TWEETING TWITTER: HOW TO MAKE INSTANT MESSAGES SLOW DOWN

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ABSTRACT

About a century ago, media transported and stored messages only by utilizing their own materiality. In this regard, media as a vehicle had developed following their materials. These vehicles were physical and tangible, so people could read or feel their message without any electronics. However, since the advent of the telegraph, the vehicle is getting more and more invisible. In this context, communication and transportation have different meanings that were once interchangeable. People have lost the link between the vehicle of a message and its materiality. In the ubiquitous environment of instant messages, an interactive project, *Tweeting Twitter* (2013), synchronizes the physical transportation with the invisible transmission on Twitter by making instant messages slow down. As a result, this project shows how to escape from the instant message for a while by giving viewers some time and space to reflect on the instance of text.

INTRODUCTION

Harold Innis researched early data storage media such as papyrus, parchment and paper. In his book, *Empire and Communications* (1950), Innis explored how a certain medium can be popular based on its material. In this regard, media transported and stored messages by utilizing their own materiality. Some media maintained their usability for a long time, but other media disappeared soon after being introduced to the world. Innis insisted that popularity depended on diverse elements; for example, affordability, weight and resistance against aging. In this way, media as a vehicle had developed following their materials. These vehicles were legible and tangible, so people could read or feel their message without any electronics, which are essential to digital reading devices. However, since the advent of the telegraph, the vehicle is getting more and more invisible. In this context, communication and transportation have different meanings that were once interchangeable. [1] As a result, communication does not need a physical transportation any more.

Joshua Meyrowitz's media grammar literacy focuses on the unique "grammar" of each medium and the way in which the production variables of each medium interact with content elements. [2] This paper concentrates on media grammar literacy in relation to the materiality of media. Instant communication, the immaterial media, has already been popular in society. This technology encourages people to communicate with each other in real time. They simultaneously post their pictures and messages and reply to them on social networking sites. In this regard, as the technology advances, information is getting more and more ubiquitous and instantaneous. As a result, we have lost the link between a message and its materiality since the vehicle has become immaterial. Why don't we have some time to think about the meanings of the terms such as ubiquitous and instantaneous? To answer that question, I created an interactive work, *Tweeting Twitter*.

This project appropriates the Twitter website, one of the most popular social networking sites. The project virtually makes the invisible transmission the physical transportation as they once were interchangeable. This creates an in-between space between the keyboard and the Twitter website, namely, the virtual transportation space between the material input device and the immaterial digital image. The method involves an effective process to make mechanical process, which is nowadays ineffective because communication should be delayed to keep up with the simulating transportation. In this regard, the sense of the mechanical age revisits to interactive art with materiality. This project resists Edward E. Shanken's idea, in which art and technology were influenced by conceptual art. In other words, art and technology are getting immaterial as conceptual art is based on an idea instead of an object. [3] In doing so, viewers can see the quasi-physical transportation of their typing in real time in the in-between space. This visualization implies two important human communications. First oral speech, which is impossible to edit or correct texts and second, movable printing press, which is the first non-human text, but still a physical interface. Ultimately, this project explores how to escape from this instant message for a while by giving viewers some time and space to reflect on the instance of text. To maximize the effect, each letter is synchronized with its own bird's song. Users listen to diverse bird sounds when they type their message. This slow message project suggests an acoustic shelter from a huge number of instant messages by creating the in-between space and time as a bridge between communication and transportation.

BACKGROUND INFORMATION

In order to delay communication to synchronize with transportation, this paper explores an effective process to make an ineffective process. This part deals with a unique process, which some artists use to make an interesting flow of changing signals from an analog to a digital device or vice versa. First, Steina Vasulka is one of the first artists who used the changing signals. Second, Christa Sommerer and Laurent Mignonneau's *Life Writer* (2006) appropriate an old input device, a typewriter, as an interactive interface. Third, it explores this process in a deep way by using Toshio Iwai's two visual sound pieces. These clearly explain the flow of changing signals.

Violin Power

Steina Vasulka used her musical instrument, the violin, as a playback interface in *Violin Power* (1970-78, 1991). This is a significant real-time interactive piece for two reasons. First, this appropriates a musical instrument to manipulate another medium, visual images. Second, this simultaneously generates visual and sound images in real time. This has an important role of tracing the meaning of the appropriated interface in interactive art. It

fundamentally suggests the relationship between *Violin Power* and the interactive sound/visual performance piece. *Violin Power* is the milestone piece in interactive art with a musical instrument unlike some current interactive works, which use loose interfaces between viewers and them.

Vasulka originally used a microphone to make an interactive performance in *Violin Power* and then developed the work by using a MIDI interface. The technology makes her manipulate a video clip in several functions. [4] This fact explains that she can be a great bridge between Nam June Paik and Toshio Iwai.

Paik is well known as a pioneer of video art. However, he is also a pioneer of interactive art. This is not a new approach. William Kaizen explored participatory qualities of his interactive art in Nam June Paik's early pieces. He described that Paik tried to overcome the passive aspect of mass communication. He made the one-way medium, television, a two-way medium, *Participation TV*. [5] In the project, Paik used a microphone to manipulate visual images in real time. Before the video art, he generated these abstract images without any video device. Vasulka used this interaction to make her performance piece, *Violin Power*.

In one of diverse versions of *Violin Power*, she simultaneously created live violin sounds and controlled a short video clip, which consists of 30-seconds of her violin playing. The interaction created a real-time editing video and showed viewers unlimited video images. Using a musical instrument as an interface in the interactive performance was an avant-garde approach. *Violin Power* goes one step further by using her performance video clip. Even though there is no random algorithm or chance operation in her work, Steina Vasulka's performance, which is never repeated, allows viewers to experience visual and sound images at the same time. The appropriated object alternately changes into a musical instrument and into a playback controller in the tension of a live performance. The instrument reveals its materiality both by breaking the role and by observing the role. The tautological relationship between her playing an actual violin and her violin video playing on the screen behind her makes its role more ambiguous and ambivalent. Finally, it breaks viewers' presupposition about the musical instrument and makes them actively think of the plural materiality of the appropriated object.

Life Writer

Typewriters eliminate human characteristics due to their mechanic representation. [6] People cannot assume who writes a text any more. However, it makes focus on the content of the text beyond the typography. *Life Writer* encourages viewers to type a letter to generate virtual images on the paper in an old typewriter. It takes us to the history of the advent of typewriter again to change mechanical texts into organic shapes. The images, which are created by a typewriter, seem to be living creatures like ants. However, the objects are just images on a paper screen. That is the reason why viewers can read life and lifelessness in the work

simultaneously and feel uncanny. To be specific, an ant is a very early object that people witness intertwining feelings between living and dead at the same time. For example, ants carry a huge dead grasshopper both in a storybook and in the real world. Beyond the uncanny, this paper talks about algorithms in *Life Writer*. This work uses genetic algorithms in Artificial Life. Genetic algorithms simulate living creatures, so it has the process of population, mating pool, mates selected, mating, offspring and new population. To make it look alive, the algorithms include random algorithms, which can generate limited variation to objects. Random algorithms can help artists approach new methods to create their works. It is not surprising that chance operation can contribute to viewing new visions and perspectives. However, we should distinguish between an analog chance operation from dice and a random algorithm based on a computer. Because a random algorithm follows a computer program, it is just an intellectual code. In other words, it is not based on real material things like a die. [7]

The artists use an old typewriter to overcome the immateriality. To emphasize it, they have viewers touch the life writer directly instead of a computer keyboard. Chance phenomena are based on their own materiality. For example, when my son gave me his handmade die, I found that it did not equally generate random numbers. Since he could not make every surface equal, the die revealed that it thoroughly depended on its material, paper. The biased random number reveals what the die is made of. In other words, it has cause and effect based on its own materiality. The materiality generates the succession of a process and endows an object with its authenticity. That is the reason why the artists want simulated living creatures to gain a relationship with something tangible. The old object, a typewriter, generates seed numbers in the work. When viewers type letters, the texts are transformed into living objects instead of real letters on a paper. The living creatures follow the rule of genetic algorithms. The process talks about the changing era from text to image and from analog to digital. Finally, a combination between an old material and cutting-edge algorithms can help make diversity of interactive art. In this project, Sommerer and Mignonneau use a random algorithm as a core link between analog and digital devices. This is a seamless project, which changes signals from analog to digital without any delay.

Music Plays Images X Images Play Music & Piano as Image Media

One of the most popular Japanese media artists, Toshio Iwai, explores the intertwining realm between music and image in art galleries, technology conferences and video games. Whereas *Life Writer* focuses on random and generic algorithm, Iwai's works concentrate on synesthesia in performance art. In this regard, Iwai collaborated with a Japanese musician, Ryuichi Sakamoto in *Music Plays Images X Images Play Music* (1996~97). When Sakamoto played the piano, the abstract images from a projector were transferred from the keys on the piano into the air. Even though this project is not an interactive media for viewers, as a performance art, we can appreciate the elegant and artistic interactive

performance. In his previous work, Iwai originally used a trackball mouse and a horizontal screen instead of the professional pianist. His famous sound project *Piano as Image Media* (1995) uses a trackball mouse to transfer signal from viewers to piano to screen. Even though the trackball mouse itself is an analog device, it helps convert the physical position into digital numbers such as X and Y positions on a virtual coordinate. The position makes dot images on the horizontal screen in between the trackball mouse and the piano; when each dot arrives at the piano's keys, a physical play occurs on the piano with real piano sounds. Finally, the physical piano play generates colorful abstract images above the piano. Iwai appropriates two different analog interfaces such as trackball mouse and piano. This selection makes the project more ineffective by adding one more changing signal to a whole process. By moving the ball, viewers can easily make sounds, but it is a little bit delayed while they witness the process of transporting the signal on the two screens. Furthermore, because the movement of the analog mouse is continuous, viewers will listen to gradient sounds and see images side by side. In other words, although viewers aggressively interact with the work, the result is not radical but smooth. In this project, the interaction with viewers, subsequent sounds and images are in harmony.

The Flow of Signal

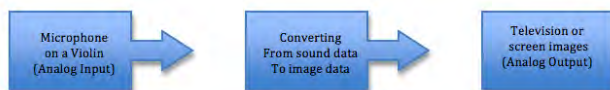


Fig. 1. The flow of *Violin Power*.

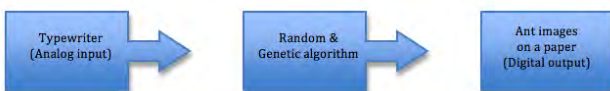


Fig. 2. The flow of *Life Writer*.



Fig. 3. The flow of *Music Plays Images X Images Play Music*.

As these diagrams show, *Violin Power*, *Life Writer* and *Music Plays Images X Images Play Music* have a similar process of visualizing analog inputs. *Violin Power* shows a transition between a sound input and a real-time image. The analog input manipulates images on television or screen. *Life Writer* and *Music Plays Images X Images Play Music* have a transferring process from an analog input to digital images. They use physical and historical devices, which are now replaced with digital devices, such as a computer and a digital piano. However, *Piano as Image Media* has a more complex procedure. In this work, the previous process

happens twice. This makes the project more ineffective. However, at the same time, the hide-and-seek process makes viewers enjoy the flow of the data delivery. This process makes the flow of immaterial signals visible. It can be effective to embody a synchronizing process between communication and transportation. I intentionally use this process to visualize the immateriality of transferring instant messages on Twitter.

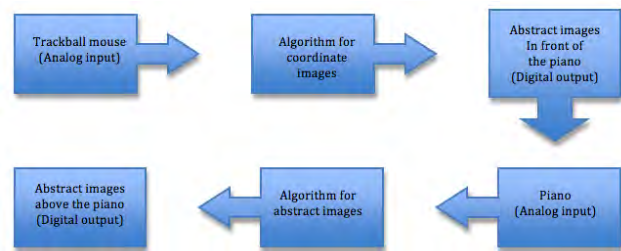


Fig. 4. The flow of *Piano as Image Media*.

THE PROJECT

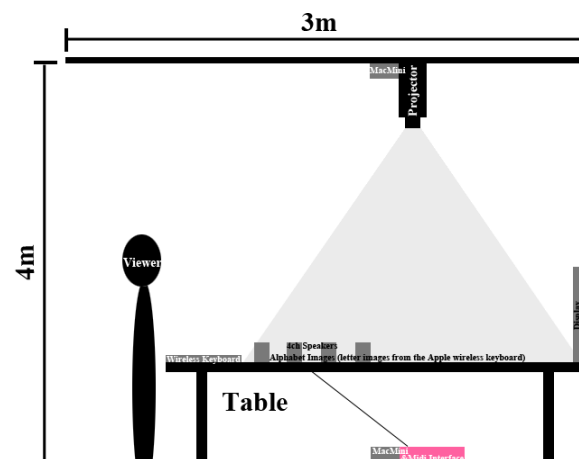


Fig. 5. The description of *Tweeting Twitter*.

Twitter, the online social network, is more similar to oral speech than writing due to its instant quality. However, there are a lot of controversial issues on the website because of the ambiguous boundary between oral speech and writing. Even though a politician uses Twitter for a casual chat, the message can be criticized by people like a public opinion in a journal. Some controversial issues are often retweeted and can be an opinion in a public sphere regardless of the original intentions. *Tweeting Twitter* explores the gap between oral speech and writing and emphasizes it by visualizing the image of communication. The project consists of three steps. Viewers type their messages on the wireless keyboard. It's a physical input action. Second, the input message is synchronized with the projected images, which have the same letter images on the keyboard, in a column in the center of the table. In real time, on the table, they can see their letters that they have just typed. The text images on the table move from the wireless keyboard to the screen as if the letter

images come from the keyboard. The same images of the real keyboard and the virtual keys can make the simple illusion that the physical keyboard moves to the display. These images on the table can also remind us of movable printing, which is the first mass production for media and also the conveyor system, which is the first effective mass production system. Finally, the display shows the posting of the same message on Twitter after receiving the texts from the letter images on the table. In other words, viewers experience the same messages with some delay on Twitter. In sum, my project consists of the process from a physical input to a visual representation of letters transportation to a real representation of the physical input.

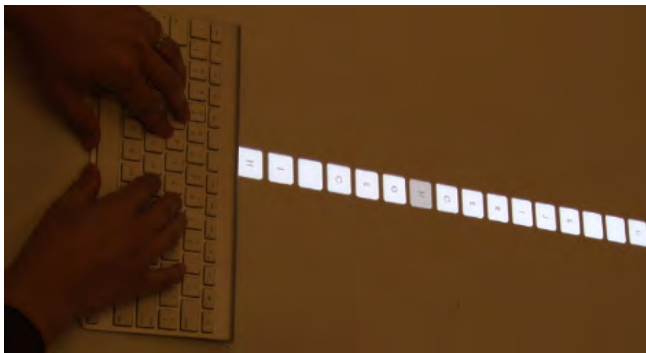


Fig. 6. The input part of *Tweeting Twitter*, 2014, Byeongwon Ha, Interactive art, © Byeongwon Ha.

In this project, I try to maximize the gap between typing and posting on Twitter. Sometimes a viewer might want to correct or edit their texts during the transfer. But they cannot change anything after clicking the enter key. The project does not have a function for editing the data at all. Viewers just witness the flow of their message. So they experience a very physical procedure, which is similar to a pitcher who throws a ball to the catcher. The invisible communication is resurrected with a visible continuity. At the same time, viewers can think about the relationship between communication and transportation. To witness their messages on the Twitter website, they need to see virtual letters on the table, which moves from the real keyboard to the screen. Since each key synchronizes with a unique bird song, users can listen to diverse tweeting sounds with their tweeting messages. To the extreme degree, they can use the interactive project as an instrument for concrete music, with progressive musician appropriated noise and pre-recorded sounds from their database in an avant-garde way regardless of the meaning of their message.

METHODOLOGY

Tweeting Twitter deals with three different procedures to visualize the synchronizing process between communication and transportation. First, viewers type their messages on Tweet. It's a habitual activity. This project appropriates this routine activity to make an interactive work. Second, the program temporally collects the text to extend the time to convey messages. It visualizes the flow of the text from the keyboard to the display.

Viewers see the process of transferring their messages. They can't intervene after typing the enter key. Third, at the very moment when the last letter arrives at the display, viewers can see their post on Twitter. By dividing the Tweeting activity into the three parts, this project explores how to create the effective process to make an ineffective process. In the end, the ineffective process helps viewers retrieve some physical time to convey media.

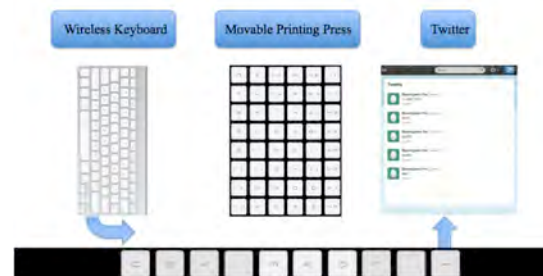


Fig. 7. The flow of signals in *Tweeting Twitter*.

Tweeting Twitter is created by Max6, which is visual programming for visual, sound and interactive artists. It is not a perfect program for using a real website because it is difficult to represent the website interaction. Even though the jweb object easily allows a Max6 user to appropriate a ready-made website in his work, the object does not permit any manipulation on websites except for basic preferences such as a window size and a website address. Using some external objects helps artists who are not good at programming overcome the problem. In the project, I used the aka objects created by Masayuki Akamatsu who is a professor at IAMAS in Japan. Especially, the aka.mouse object automatically allows artists to control the mouse position and take the cursor key to a specific position, the typing box and the post button on the Twitter website. The aka.keyboard object types messages, which were stored from the viewers. Even though I don't have any knowledge on hacking a website, by using these controlling objects, I could make an interactive piece, which controls viewers' messages.

Since Max6 is a powerful sound program, I could simply add diverse bird songs to the piece. Each key has its own bird song except for the space bar key, which has a stream sound. The upper case letter means loud sound whereas the lower case letter means the same sound with a soft volume. These alphabet letters have bird songs that I recorded by using a microphone near the exhibition whereas special characters have bird songs from the free sound websites. This implies that letters are chosen by a physical place where the project exhibits whereas special characters are universal wherever we are. This method is that the project returns the first idea, which makes Twitter tweet. When viewers type any letter or special key, they can listen to diverse bird songs and the streaming sound from the four channel speakers. Making Twitter tweet can be a pun. However, this decision makes the project more exciting and enjoyable to the viewers. It can make the messages slow down to listen to these discrete bird songs.



Fig. 8. The *jweb* object on the *Tweeting Twitter* patch.

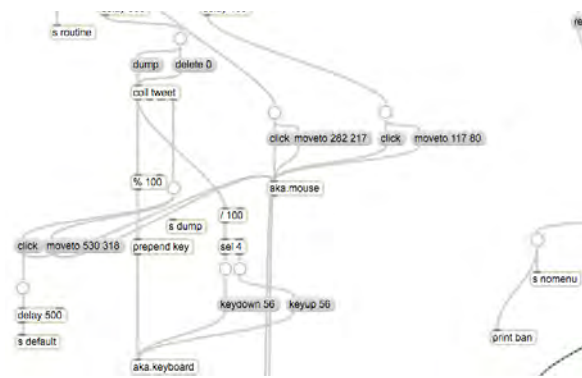


Fig. 9. The *aka.mouse* and the *aka.keyboard* object on the *Tweeting Twitter* patch.

In the final patch, to improve the resolution of each letter, the project uses the *jit.gl.videoplane* object instead of the *jit.glue* object. This decision has two great advantages. First, this project has a very long single line with letter images. If this project uses the *jit.glue* object, the resolution of a whole images on the table is bigger than 4K (about four-times better quality than High Definition format). Even though I only use a narrow column on the whole screen, the *jit.glue* object renders a whole resolution. This makes the project sluggish. However, the *jit.gl.videoplane* object effectively assigns each letter image on the screen by using Open GL. Although this object needs some mathematics to make each letter image precisely move one by one on the screen, it can give viewers a better resolution. We could not see legible letters on the table unless the project uses the specific object. Although a user can post 140 words on Twitter, this CPU capacity suggests 70 words since several elements should be considered such as a resolution, a projector's condition and a screen size. It is the decent performance of my 2.8 GHz Intel Core 2 Duo MacBook Pro. If I use another programming such as processing, I could easily get a decent letter image. However, it is hard for me who is not good at programming to play diverse pre-recorded files and appropriate a ready-made website in a text-based programming. The most important thing is that I could make it by myself. To me, Max6 is the perfect choice to make interactive art without any helps from a technician.

CONCLUSION

This project started with a simple idea that synchronizes communication with transportation. However, it involves an effective process to make the ineffective process. It is a paradox, but in order to make communication transportation once again, this is a mandatory process. This process visualizes the changing flow of analog and digital signals. The signals in the air are captured by the physical space that shows virtual letter keys. By identifying the size of the letter images with the real key size of the keyboard, the project can emphasize the seamless flow of the signals from the keyboard to the display. With diverse bird songs, viewers can listen to them before their message arrives on the Twitter website. The short moment can allow us to witness moving letters on the table. This defers our message and presents a sound installation.



Fig. 10. The output part of *Tweeting Twitter*, 2014, Byeongwon Ha, Interactive art, © Byeongwon Ha.

We can easily post our texts on the Internet. People can immediately talk on blogs or social networks. In this regard, this project encourages people to think about what they post. This is not only about the content of it, but also the action of it. *Tweeting Twitter* gives people some time to think about the instant message itself and some space to objectively reflect on their action with bird songs in nature. This is an auditory shelter from a plethora of instant messages.

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VOICINGELDER: AN AVATAR PLATFORM FOR OLDER ADULTS INFORMED BY MULTIPLE THERAPEUTIC TRADITIONS

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ABSTRACT

In the United States and elsewhere, we are being challenged to think of a new phase of life called 'elder hood.' It is critical that we think about how to shape elder hood in ways that are beneficial to both the individual and community. *VoicingElder* is a reminiscence storytelling platform designed for older adults, using an avatar and facial recognition software. Storytelling and reminiscence are enormously important processes in old age because they nurture intergenerational sharing and communication and allow seniors to express and strengthen their identities as they review and share their memories. In *VoicingElder*, the puppeteer (the senior) controls an on-screen avatar through facial recognition and voice input. The avatar may represent the senior's younger self, a relative or an imaginary character. The software instantly translates the senior's facial movements into the facial movements of the avatar. The senior can thus emotionally embody the avatar, bringing a transformative and emotional character to their oral storytelling process. *VoicingElder* is a hybrid therapeutic tool that embraces several therapeutic traditions. Research in drama therapy, therapeutic puppetry, patient centered therapy and avatar therapy all bring different ways to explore the user's psyche, emotion and engagement in depth.

INTRODUCTION

VoicingElder is an avatar platform designed to structure a therapeutic intervention for older adults. This project is informed by research in gerontology, electronic arts, drama therapy, therapeutic puppetry and avatar therapy. This paper will explain the diverse background of *VoicingElder*. Designed by an electronic media artist and a gerontologist, *VoicingElder* reimagines the therapeutic technique of life review in a responsive, interactive design platform. For several decades, many adult care facilities have practiced life review. In a typical life review session, a facilitator guides older adults through structured reminiscence or story telling. Facilitators often use photographs, verbal prompts or objects to elicit the older adult's memories. *VoicingElder* takes this practice one step further by introducing an interactive avatar system. The *VoicingElder* system utilizes facial-tracking camera, combined with custom software and costumed-designed characters. To use *VoicingElder*, the older adult simply tells their life stories as usual, but this time they look directly at the on-screen avatar. The *VoicingElder* software tracks the older adult's facial expression and lip movement and translates that movement onto the avatar. As the older adult is telling their story, they are watching the avatar mimic their facial expression exactly. The older adult thus acts as a puppeteer, controlling the on-screen puppet. The older

adult speaks through the avatar, telling their story in the dramatic space offered by the performance of oral storytelling with a digital puppet. Speaking through the *VoicingElder* avatar turns life review into a performance.

The *VoicingElder* avatars are designed to reflect different states of memory. For instance, the "young girl" model is designed to look like an animated version of the older adult's younger self. *VoicingElder* utilizes the setting and mechanisms of life review as a therapeutic technique. By embracing the performative aspects of storytelling, *VoicingElder* incorporates aspects of drama therapy and therapeutic puppetry. By embracing the concepts of dramatic reality and distancing, *VoicingElder* aims to enhance the practice of life review. Through electronic arts techniques of avatar design and motion-tracking cameras, *VoicingElder* brings electronic arts to a population typically overlooked by electronic arts.

We believe that *VoicingElder* fills a gap in research related to electronic arts and older adult care. According to the US Department of Health and Human Services, the number of older adults over 65 years of age is expected to rise from 43.1 million in 2012 to 71 million in 2030 and will make up 20% of the population. Adults age 65 and over are the fastest growing segment of the population. [1] With this growth, we need to develop new ways to shape elderhood and to encourage positive mental and physical health of the aging population.

Involvement in arts programming for older adults has been linked with increased overall activity, decreased trips to the doctor, higher overall physical health, less medication use, fewer instances of falls and fewer health problems. [2] Drama therapy has been linked with increased memory capacity and psychological wellbeing. [3] Because of this, the National Endowment for the Arts, reported that, "In older adults, arts engagement appears to encourage health-promoting behaviors (physical and mental stimulation, social engagement, self-mastery and stress reduction) that can help prevent cognitive decline and address frailty and palliative care through strengths-based arts interventions." They continue, "Intergenerational arts learning offers great promise for leveraging the strengths, skills and experiences of older adults." They stressed a need to increase the research into the effectiveness of different kinds of arts therapies [4]

VoicingElder answers the NEA's call to research the effectiveness of arts therapies that harness the unique skills and experiences

of older adults. By drawing on a lifetime of experience, life review aided by *VoicingElder* draws the older adult's life history into a performative context, aided by the avatar platform.

LIFE REVIEW

Life review is defined as “a systematic, chronological review of one's entire life from early memories through the present and involves evaluation of the meaning of life experiences.” [5 - 8] Life review has been practiced for decades in adult care facilities. Guided by a facilitator, participants recount important stories from their life in a group setting.

First introduced by Butler, life review is based in reminiscence or the natural desire for older adults to tell stories from their life. [9] Placed in a structured therapeutic setting, group facilitators can guide older adults in a systematic and chronological review of their life, aided by photographs, objects and other items to evoke memories. Life review promotes bonding between people, helps older adults to deal with current problems and helps to foster integrated, coherent identity. [10] Research shows that life review has significant effects on late life depression and can work as an alternative to psychotherapy. [11] Some studies have also showed that life review reduces. [12], [13] Life review has been shown to improve relationships between caregivers and seniors, increase staff knowledge of the client's backgrounds and history and help older adults to develop understanding of their sense of self. [14]

Life review is also a beneficial opportunity for intergenerational sharing. In a study by Luepker, researchers included the older adult's family in generating the prompts for the life review process and also video recorded the session for future review. This led to an increased sense of intergenerational sharing and older adults reported more a cohesive sense of self after the interviews. [5]

Korte, Westerhof and Bohlmeijer identify two types of reminiscence in life review: integrative and instrumental. [15] Reminiscence is instrumental when it helps older adults to cope with present problems. Reminiscence is integrative when it includes both positive and negative memories in life review. [13] Oral storytelling is an ancient and cross-cultural tradition that has important benefits for cultural heritage and intergenerational sharing. As a therapeutic technique specifically designed for older adults, life review harnesses the powerful therapeutic potential in narrative stories. *VoicingElder* is interested in the same goals as life review: to promote increased communication between older adults and caregivers and family, to increase the older adult's sense of a coherent self, to improve the quality of life of older adults and to increase intergenerational sharing and continuity of family legacy.

VoicingElder builds upon all of the above methodologies and expands upon them in new ways. Life review has been shown to be a successful intervention to address multiple aspects of quality of life in older adults, however, most studies structure life review around stable media such as photographs or physical objects

from the older adult's past. With *VoicingElder*, we believe that many of the benefits of life review can be achieved through the transformative structure of the avatar platform. *VoicingElder* adds an interactive and reflexive element to the performative space of life review. By gazing at their own avatar, the older adult simultaneously is both a performer and a spectator. Their avatar speaks as they speak and moves as they move. By displacing the point of action, the older adult puts their own story at a distance. This technique, known as “distancing,” allows a greater emotional engagement with one's own history, especially with those elements of the past that are difficult to integrate or are painful or too emotional. By introducing a performative element and mechanism for externalizing the sharing of stories, *VoicingElder* takes life review from a narrative therapy into a performance therapy.

DRAMATIC REALITY & DISTANCING

In drama therapy, patients and therapists use the distance created by an artistic pursuit such as performance, storytelling, music or dance to guide the patient to make sense of their life experiences. [16] Penzdek describes the role of the therapist in drama therapy as transporting the patient through dramatic reality. Dramatic reality is defined as “the manifestation of imagination in the here and now.” [17] Johnson likewise uses a concept called playspace, which he defines as “an enhanced space where the imagination infuses the ordinary.” [18] The content of the role playing or dramatic performance—whatever the patient is exploring in dramatic reality—is transformed through this passage. The patient may have explored difficult memories or expressed something they could not express in their real life. Once a patient leaves dramatic reality, they integrate dramatic reality into their real life.

This transformation offered by dramatic reality has been described by Landy as distancing. Landy writes, “Drama therapy is a powerful method of healing because it provides a way to re-experience pain, sometimes overwhelming pain, through the safety of aesthetic distance. In its most pure sense drama therapy is play, a representational process of moving in and out of the looking glass.” [19] In Landy's description of the looking glass, he references the same idea as dramatic reality.

In drama therapy, there is an aesthetic distance between the patient and the object or process before them. Jones (1996-drama as therapy) also identifies distancing as a crucial component of drama therapy. [20] In theater, the concept of distancing comes originally from Brecht. [21] In Brecht's employment of distancing, the audience was hindered from passively identifying with the characters in the play. When the actors disregard the “fourth wall” of the stage, the audience can not simply passively accept that they are watching a play. The audience is thus alienated or distanced from the actors. Brecht's technique created conscious, active engagement. [21] As a technique of drama therapy, distancing creates a space – dramatic reality – in which to explore one's memories or life

problems by consciously engaging with, role-playing and re-enacting them. Facilitated by a therapist, this journey through dramatic reality can have positive, transformative effects. *Narrative therapy*, developed by White and Epston, focuses on creating distance between the patient's sense of self and their life stories. By focusing on the benefits of "telling and re-telling" life stories, narrative therapy externalizes life problems and moves away from "problem-laden" stories. [22] Patients can use narrative therapy to develop "thick stories" that strengthen their sense of self by creating distance between their self and the problems they face. [23 - 26]

In *VoicingElder*, as the older adult tells their stories, they are gazing at the avatar of themselves. This emotional and physical distance allows them to be at once the speaker of the story and an observer, speaking through the outside position of the avatar. In this dramatic reality, it is the puppet who is speaking, not the older adult. Because the older adult is brought into the dramatic reality of performance of their life story, they are distanced from their own life review. This process allows them to consciously integrate positive and negative memories and strengthen their sense of self in relation to their life history.

THERAPEUTIC PUPPETRY

One form of drama therapy that is particularly important to explain the basis of *VoicingElder* is puppet therapy. The on-screen avatar is essentially a puppet that the older adult controls simply by speaking and acting normally. Yet because they can enter the performative space as a puppeteer, they can benefit from the transformative aspects of entering dramatic reality to tell their life stories. Researchers have suggested that puppets may be beneficial for patients with mental illness. [27 - 30] Therapeutic puppetry is defined as the use of puppets to aid physical and emotional healing and can include the use and construction and observation of puppet performance. [31]

Particularly useful to explain the background of *VoicingElder* is the concept of the puppet as a psychodynamic object. In this model, the puppet represents parts of the self. By acting out their complex emotions using the puppet, the patient re-creates their internal state in an external form, helping to craft a more coherent self and resolve "splits." [27] Holmes similarly suggests that puppets can help patients achieve "autobiographical competence." [32] White & Epstein suggest that puppets help patients to create "thick" stories that incorporate lost or fragile memories, as opposed to the "thin" stories of the self that can overly dwell on shortcomings and stigma.

Although many studies with therapeutic puppetry focus on children, therapeutic puppets have been shown to be an effective therapy for adults with severe mental illness. [33], [34], [35], [36] One classic study in therapeutic puppetry for children demonstrated that role-playing with puppets reduced children's fears and increased their comfort before and after a hospital

procedure. [37] Many studies have demonstrated the effectiveness in puppet therapy for reducing anxiety. *VoicingElder* is a form of therapeutic puppetry that uses an interactive virtual puppet so that the older adult does not have to learn how to operate a puppet. By simply moving their body normally, the older adult controls the puppet. As it represents aspects of their self, the puppet can serve to incorporate lost parts of the self and integrate them into a coherent whole. This echoes the benefits of life review that have been empirically demonstrated. By utilizing research in puppet therapy, drama therapy and life review, *VoicingElder* is designed to work based on the mechanisms that make these forms effective therapies.

AVATAR THERAPY

VoicingElder is not the first therapeutic technique to use avatars. Therapists have explored using the immersive virtual world SecondLife as a site for psychotherapy. [38] [39] And researchers have had success using avatar-based interventions for depression. [40] Recent interest includes using avatars and virtual reality to reduce pain in hospitalization, anxiety and depression. [41] Virtual reality therapy is now commonly used to treat post traumatic stress. [42], [43] Virtual reality therapy allows patients to explore trauma and difficult situations in a safe and controlled environment. In a recent study, researchers used dynamically controlled avatars to bring to life patient's visual hallucinations. By providing a face for the patient's mental image of their hallucination and by controlling that image in real time, the therapist was able to embody the persona of the patient's hallucination. The experience for the patient is that they are speaking directly to their hallucination. In conversation, the therapist gradually cedes control of the persecutory illusion to the patient. In the dramatic reality offered by their avatar platform, the patient was able to practice taking control over their own hallucination.

This technique was deemed effective in reducing the frequency and intensity of persecutory illusions. [44], [45] While researchers have used avatars in many different ways to increase the efficacy of therapy, *VoicingElder* is unique in that it places the older adult at the center of the therapeutic intervention. *VoicingElder* is person-centered because it allows the individual to narrate their own life stories. As opposed to many of the avatar-based therapies in which a therapist controls an avatar or an otherwise normal therapy session is held in a virtual environment, with *VoicingElder* the older adult controls their own avatar.

PERSON-CENTERED CARE

Healthcare and allied healthcare professionals have been increasingly moving toward a holistic model of care that emphasizes the older adult's perspective and their individually defined experiences and needs. The concept of person-centered care builds on a fundamental respect of subjectivity and personhood that personalizes care, emphasizing the person's past, present and emerging life history as well as respecting people's values, culture, priorities and preferences. The person-centered

model moves away from the medical-oriented and professional driven models of care to a perspective that promotes individual autonomy in all settings. A person-centered approach uses a social, humanistic and holistic perspective on how to understand and promote the best possible life and care for people. [46], [47] Older age is an appropriate time for evaluating one's life and this can be accomplished through a life review – a purposeful, constructive effort to review one's life and gain perspective. *VoicingElder* initiates a life review process by engaging with recent developments that focus on the individual's role in the development and implementation of their own care – person-centered care. Utilizing the concepts of drama therapy, distancing and dramatic reality, *VoicingElder* sets up a structured life review session in which the older adult narrates their own life stories in a performative setting.

VoicingElder promotes person-centeredness by creating a platform that facilitates the growth of each individual and promotes reflection, healing and generativity. In the *VoicingElder* experience each participant is responsible for their own transformation; setting their own guidelines for how they would like to share their life experiences. No two people will experience *VoicingElder* in the same manner. The integration of drama therapy, puppet therapy, avatar therapy and life review creates a unique and valuable person-centered experience that can improve overall well-being and quality of life for older adult participants.

CONCLUSION

VoicingElder is in a pilot phase of development. With the help of an electronic arts design team, we are constructing multiple avatars and developing software to animate the avatars in real-time based on input from facial-tracking cameras. The research background of *VoicingElder* is based on drama therapy, puppet therapy, avatar therapy and life review. When tested, *VoicingElder* will be implemented in life review sessions at an older adult care facility in Richmond, Virginia. *VoicingElder* uses standard therapeutic techniques such as distancing, externalization, dramatic reality, "thick" life descriptions and building coherent and integrated identity. Many of the therapies mentioned here embrace the power of self-narrative to build better coping skills, reduce anxiety and depression and promote intergenerational storytelling. *VoicingElder* promotes these same techniques by giving older adults the opportunity to tell their life stories in real-time responsive avatar system.

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META_NARRATIVES

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ABSTRACT

Using technologies that led to petroglyphs (rock art) in the open air and rock paintings protected in caves, storytelling with images is the first record of our spoken tales. The exhibition entitled *meta_narratives* presents works by artists who re-interpret the manner in which stories are told and includes works based on early bark paintings through to the transmedia and interactive narratives being produced today. *meta_narratives* presents contemporary and frequently interrupted reception of texts and histories as explored by artists who find new modes of presenting our stories back to us. The artists place the stories and histories firmly center stage and are exemplary for their finely crafted and appropriate use of electronic and digital technologies in visual and audio portraiture. The works selected for exhibition in *meta_narratives* include an animation based on a bark painting from northern Arnhem Land by John Gwadbui; a complex eight-channel audio sound work and sculptural installation about rare inter-species collaboration by Nigel Helyer; an animated map in henna of the Middle East by Rusaila Bazlamit; an interactive work about Eastern Europe WW2 history by Bronia Iwanczak and the transmedia exploration of all things Luna by Clea T. Waite and Lauren Fenton.

META_NARRATIVES

Every morning brings us the news of the globe and yet we are poor in noteworthy stories. This is because no event comes to us any longer without being shot through with explanation. Actually, it is half the art of story telling to keep the story free from explanation as one reproduces it. [1]

The exhibition entitled *meta_narratives* brings together artists who re-interpret the manner in which stories are told and whose work engages our imagination. While the narratives chosen by each artist are suitably complex for our times, each is presented with a creative clarity that invites us to use our own imaginations to open up to the scale and meaning of the stories and events they are recounting. Each of the artworks included in *meta_narratives* presents gateways into historical and imagined narratives. The works do not offer explanations; they tell a version of the story and offer a space to enlarge our capacity to accommodate others.

Using technologies that led to petroglyphs (rock art) in the open air and rock paintings protected in caves, storytelling with images are the first records of our spoken tales. *Meta_narratives* includes works based on early bark paintings by an Australian indigenous artist through to the transmedia and interactive narratives being produced today. All the artists included in *meta_narratives* are exemplary in the finely crafted and appropriate use of electronic and digital technologies, giving the stories and histories center stage because of the artists' techniques in visualization and audio portraiture. The content of the stories is the most important

element of their explorations, while the technologies are employed carefully so as to not subsume these narratives and histories. The resulting sophisticated pieces really encourage us to be able to reflect on the content – a precious gift in these times of the three-second-sensationalised videograb/sound bite/feed. The topics that the artists are dealing with are very large conceptually, almost too large to contemplate in any ready manner. I am intrigued by the way in which all the works begin with showing us something condensed and manageable and then beautifully lead to unfolding and unwrapping layers of meaning, thereby giving us an entre into worlds which may otherwise be locked off to us.

The artists present large tales and small, intently reflecting on and responding to the specifics of the sites from which the stories are sourced: the moon, a small town off the coast of south eastern Australia, a small island off the coast of Arnhem Land, Eastern European sites and the Arab states. These sites provoke a sense of excavation, an archeological inquisitiveness on the part of the artists. *meta-narratives* presents contemporary versions of frequently interrupted transmissions of myths and histories.

One such work is *Marrwakara Story* (digital animation made in 2013 of a bark painting made in 1964 and sound recordings made in 1962-4) of a mythical journey to an island (South Goulburn Island) in the far north of Australia. The animation is drawn from a sketch on bark painted 50 years ago by John Gwadbui, depicting the *Marrwakara Story*. The animation is accompanied by the sound recording made by Ronald Berndt between 1962-1964 of Gwadbui singing the related cycle of songs. The songs tell of events narrated to him in a dream by his two 'spirit familiars' marrwakara (goannas). In the digital animation of Gwadbui's sketch, we see 'a telescoped sequence of events' depicting a celebration and a tragedy. The digital animation was created so that the coming generations would continue to have access to these stories as the bark paintings are too fragile to be constantly accessible to community members. The animation prepared by Toby Tan Smith was created with the permission of the artist's family for the Berndt Museum's exhibition *Little Paintings, Big Stories: Gossip Songs of Western Arnhem Land*, 2013 curated by Eve Chaloupka and Kelly Rowe, Berndt Museum, University of Western Australia. [2]

Marrwakara Story tells of the spirit goannas who live on the mainland of Arnhem Land and are invited to visit the South Goulburn Island by the island's goanna and his wife, the goose spirit. However, an important mainland goanna falls in love with the goose wife, an amorous liaison forms and she has a child by him. The liaison is discovered and the goanna from the mainland must die. After he is killed, he is given a ceremonial burial and we see his funeral barge offshore.



Fig. 1. *Marrwakara Story*, 1964, John Gwadbau, Ochre on Stringybark, Mwang Language, Western Arnhem Land NT. RM and CH Berndt Collection (WU1236).

The structure of the bark painting of the *Marrwakara Story* lends itself to contemporary digital animation because it is so much like a storyboard showing the events unfolding simultaneously. Given the level of care required for bark paintings, these cultural artifacts are not often circulated in community contexts, hence the use of the accessible format of digital animation and audio and in this case successfully maintains the original graphic style. John Gwadbau's son, Jonah, is now the traditional custodian of this story and song cycle and has kindly given permission for this work to travel from his remote community. I would like to thank the Berndt Museum staff at University of Western Australia and Brenda Westley from the Mardbalk Art Centre who assisted in community discussions to include this work in *meta_narratives*.

The evocative and endlessly engaging *Meta-Book: The Book of Luna* ©, (2014, interactive installation) by artists Clea T. Waite and Lauren Fenton is a transmedia illuminated manuscript that merges sculpture, film and literature. The work is presented as an interactive 'cabinet of curiosities' that has collected different perspectives and responses to our view and perceptions of the moon. Humans share a fascination for the moon through our imagination, awe, scientific investigation and romantic projection. It is our most intimate cousin in the sky that places us visually in the universe and continually affects us all on planet earth. Waite and Fenton have explored all manner of things Luna to encapsulate and return our imagined and researched histories to us.

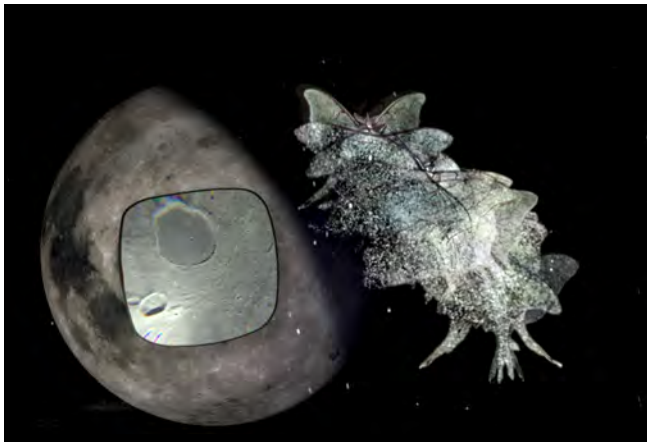


Fig. 2. *MetaBook: The Book of Luna* ©, 2014, Clea T. Waite and Lauren Fenton, interactive installation. Photo: Clea T. Waite.

MetaBook: The Book of Luna is an expanded cinema installation, an electronic cabinet of curiosities that formally examines how structural and dynamic montage can be employed in counterpoint to create experimental narratives and immersive experiences. A participatory artwork combining the experiential qualities of text, sculpture, interactive media and cinema within the enclosed architecture of a tabletop object, *The Book of Luna* narrates a poetic essay about the moon's place in the historical imagination. The nature of love, madness, the unknown and our capacity for the sublime are amongst the intellectual passions that have crystallized around our only satellite. Unfolding across a series of projections and nested spaces, this artwork treats the moon both as a poetic concept and as a concrete, navigable place. The reader is invited to fly in orbit between texts written and inspired by some of the moon's great philosophers and scientists and the lunar craters that have been named after them.

As a hybrid artifact bringing together illusion and science, aesthetics and apparatus, the *MetaBook* re-invents expanded cinema according to a neo-baroque logic of serial miniaturization that unlocks proportionally vast sensorial and imaginary realms. [3]

In the *Law of the Tongue – Symbiosis and Betrayal* (2010, eight channel sound sculpture installation) Dr. Nigel Helyer weaves a narrative around the only historically documented hunting collaboration between humans and another species. This eight channel sound installation builds an audio-portrait of an interspecies relationship initiated by a pod of Orcas (Killer whales) with the Davidson family, who ran a small shore based whaling operation in Eden in South Eastern Australia during the late 19th and early 20th centuries, to chase and hunt migrating Humpback whales together. *Law of the Tongue* sonifies non-human communication and immerses the listener in the songs of the oceanic realm, a world that we understand so little.



Fig. 3. *Law of the Tongue ~ Symbiosis and Betrayal*, 2010, Dr Nigel Helyer, 8 channel sound sculpture. Photo: Nigel Helyer.

He who fights the monster should be careful lest he thereby becomes a monster. And if thou gaze long into an abyss, the abyss will gaze into thee. [4]

For millennia, Killer whales (*Orcinus Orca*) have hunted Baleen whales along the coasts of Australia, driving them into shallow bays from which they cannot escape. Likewise, for millennia the Yuni people of Twofold bay near Eden in New South Wales have formed a spiritual bond with the Orcas (Beowas to the Yuni) whom they considered to be reincarnations of their tribal ancestors and to whom they sang; believing that the Orcas responded intentionally driving Humpback whales to strand in the Bay as a food offering to their tribal members. Indigenous Yunis were also the mainstay of the settler population and the Davidson families whaling crews, rowing the small whale boats and wielding the harpoons and lances that served the coup de grace to the whale quarry that the Orcas had led them to.

At the end of the chase the carcass was lanced with a marker and the boats returned home to the shore, leaving the Orcas to their reward, the massive tongue and sometimes the lips of the Humpback – that was the unwritten and unspoken agreement; the *Law of the Tongue*. The following day the men would retrieve the carcass and tow it to the flensing deck to render it as oil. Helyer's *Law of the Tongue* compelling and evocative installation operates with eight parallel audio tracks, six driving solid state audio actuators that activate the skeletal vessel and three ships' oars. The remaining two tracks drive two large sub-woofers buried in the three meter long (life size) neoprene "whale's tongue." The sonic data is drawn principally from sonified water quality data, whale recordings and hydrophone recordings. [5]

In *Timebinder* (2010: interactive, 2004: artists book), Bronia Iwanczak tackles the seemingly impossible task of presenting the events of the Holocaust. Iwanczak has carefully excavated objects from several Eastern European sites to investigate whether the objects contain any resonance of trauma that could be detected by self-described psychics. *Timebinder* documents the psychometric responses of six clairvoyants to fragments collected from a variety wartime sites of WW2, including Hitler's Lair, Lamsdorf (the labour camp the artist's father was interned in) and Auschwitz-Birkenau. This work sits at the intersection between subjectivity and history: how we come to embody, if at all understand the nature of historical events that exceed rational understanding.

The primary element of *Timebinder* comprised of several objects that the artist retrieved from the site of Auschwitz-Birkenau, including a piece of barbed wire, a rail peg and a shard of glass. To Iwanczak, these material remnants carry with them the memories of the horrors that transpired here. Yet rather than exhibit only the fragments themselves, she sought to elicit from them their 'testimony.' Iwanczak took the objects to a number of psychometrists – the reverend of a Sydney Spiritualist church, a forensic clairvoyant and a Maori who works with indigenous

communities – who 'read' them, measuring their emanations and thereby forged a palpable if tenuous link or 'binding' over time and space, between Sydney in 2004 and Birkenau in 1944. The artist recorded these interpretations in book form, displaying them alongside the objects in a cabinet. [6]



Fig. 4. *Timebinder*, 2006, Bronia Iwanczak, mixed media. Photo: Hamish Tame.

In *meta_narratives* we see the interactive (made by Gary Warner) version of this work whereby (as with *Marrwakara Story*) the work immediately becomes more accessible to a wider range of audiences and age groups. The interface which is reminiscent of the book still resonates as we enter the 'stories' of the various objects and see the responses of the various psychometrists. By bringing such minute residues into our focus - through the intimate objects presented in a cabinet, an artist's book and the subsequent interactive, we are offered a space to reflect on the Holocaust. This is a radical invitation but one extended with care. The self-control exerted by the artist reduces the sense of being overwhelmed which is an emotion so frequently experienced when looking at images and hearing stories from those camps.

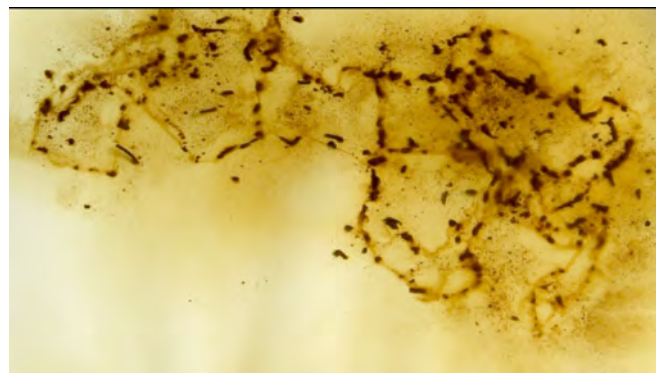


Fig. 5. *My Homelands*, 2013, Rusaila Bazlamit, HD video. Photo: Rusaila Bazlamit.

My Homelands (2013, HD single channel video 3.34mins) by Rusaila Bazlamit uses the tension between an image of the Arab countries map deconstructing while a famous Arab nationalistic song is being hummed. Using henna as a basis to produce her "map" Bazlamit upsets the order and boundaries of

place during the filming of the work. The result suggests a tumultuous yet poetic erasure, leaving us to ask how, who and what next? Bazlamit provokes the viewer to look critically at and think about Arabism, Pan-Arabism, Arab Spring, Nationalism and Identity. Presenting the flux of borders and nations we are given an insight into the contested zones and recall social, political, colonial and global disruptions of older and recent times. The use of henna brings women into the frame in a way that traditional broadcast media tends to ignore. The works presented in *meta_narratives* and curated as part of the ISEA2014 exhibition programme are contemporary digital, electronic and interactive presentations which are simultaneously some of our oldest tales.

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SELENOLOGY AND THE CURIOUS TOPOLOGY OF A LUNAR NARRATIVE

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ABSTRACT

The Moon embodies history, philosophy, cosmology and passions; the nature of love, persecution and our capacity for the sublime. *MetaBook: The Book of Luna* is a transmedia object that bridges the analog and the digital by introducing a cinematic and interactive dimension to the cabinet of curiosities. This work presents a navigable topology of lunar narratives and maps, exploring texts written by some of history's great philosophers and scientists across a series of embedded media technologies; select works that have profoundly influenced our epistemological, ontological and poetic knowledge of the universe with the Moon as a central theme. By following the craters that have been named for these thinkers, the piece navigates the philosophy of Aristotle and the poetry of Lucian of Samosata, the factual and fictional findings of Johannes Kepler, Galileo, Leonardo Da Vinci, Copernicus, Jules Verne and others.

METABOOK: THE BOOK OF LUNA

The Moon. It has been the battleground for science, religion and politics. Heresies were declared over the questions of its place in the Heavens. Science fiction was invented as a ruse in the Renaissance struggle to commence the modern age of science. The query into the Moon's nature, its place in the cosmos and in our lives has reflected and diverted the trajectory of Western art and science. *MetaBook: The Book of Luna* is a poem of the intellectual passions that have crystallized around our only satellite, profoundly influencing our knowledge of the universe. It is a mashup of selenological aphorisms, musings and observations from select luminaries, philosophers, poets and scientists after whom the Moon's craters were named: Ariosto, Aristotle, Aristarchus of Samos, Copernicus, Cyrano de Bergerac, Endymion, Leonardo da Vinci, Galileo, Johannes Kepler, Lucian of Samosata, Plutarch, Ptolemy, Jules Verne, H.G. Wells, Hippocrates, Plato, Pythagoras, Valentina Tereshkova, Yuri Gagarin and Tycho Brahe.

The first *MetaBook*, *The Book of Luna*, is an expanded cinema installation and an electronic manuscript that formally examines how structural and dynamic montage can be employed in counterpoint to create experimental narratives and immersive experiences. *The Book of Luna* contains a navigable topology of lunar narratives and maps, exploring texts across a series of embedded media.

LUMINARY SPECULATIONS

Kepler imagined a journey to the Moon, gazing back at our Earth when he arrived there to see it spinning like a top in the void as the two spun together around the Sun and claimed it was a dream so that he could dare to tell it. His universe was composed of perfect polyhedral that sang the harmonies of the spheres. Kepler's earthlike Moon also featured mountains, rilles and seas, replicating

Plutarch's theories of 1500 years earlier. But Plutarch also gave us reports of a translucent, turbid moon or a flawless mirror reflecting our Earth back at us from the sky. DaVinci, with his habit of reading things in reverse, knew that it is our earthly oceans that act as a mirror, casting a glimmer of earthshine, the *lumen cinereum*, for those who stop to see it on the dark part of the new moon. Aristotle had previously proclaimed the heavens to be filled with immaculate spheres, while Ptolemy placed the Earth at the nexus of that universe. Copernicus could not agree with Ptolemy and Rome declared that a heresy. Cyrano flew there carried by vials of dew to challenge the political status quo from its safe shores. Lucian also sailed to the Moon, which he populated with winged people, to ridicule earthly doings from there. Ariosto imagined the Moon as a veritable junkyard of human passions and foibles, while Pythagoras told us that all human spirits reside there in death. The goddess Persephone reigns there as she prepares our souls for rebirth while her mother Demeter, the Earth, darkens the Moon's face, causing an eclipse as she searches for her child's embrace. Persephone's realm, the Elysian Fields, are just over the limb of the Moon, beyond our vision. Galileo took to the sky with empirical observation rather than speculation, uncovering a lunar landscape of valleys and craters that mirrored the earthly imperfections of our own world. He paid with his freedom for bringing in a new age. Jules Verne, a soldier, sent his characters to the Moon using a canon, showing an excellent understanding of rocket ballistics and gravity, as well as the thinning of the atmosphere. Verne even placed his launch pad in southern Florida, near Cape Canaveral, based on the same reasoning that later motivated NASA. Verne and H.G. Wells were both granted craters in homage to the accuracy of their fictions. Cosmonauts Yuri Gagarin and Valentina Tereshkova close this long unwinding of a continuous speculation that, throughout the history of human curiosity, slowly bridged the epistemological and finally, the physical space between our species and the moon. These navigators that seem to emerge, in the flesh, from the scientific fantasies of earlier lunar explorers, speak to us directly from space. Every lunar crater has a story to tell.

A TOPOLOGY OF CURIOSITIES

The Book of Luna's poetic essay unfolds across three projections and a series of nested spaces, all housed in a wooden cabinet with multiple compartments. Within these compartments are contained miniature projections on a scroll-like screen, a glass globe and a Pepper's Ghost illusory mirror effect, as well as electro-mechanical devices fully integrated into the body of the cabinet, a joystick and a hand-cranked rotary encoder that allow the user to interact with the projected material. A collection of evocative objects in more compartments augments the narrative into a structural montage that extends between the physical and

the virtual space. *The Book of Luna* treats the Moon as both a poetic concept and as a concrete place, spaces that are equally and indeed simultaneously navigable. The work creates a topological metaphor that superimposes a virtual with an actual selenographic space (Fig. 1).

This dynamic montage of both digital and analog objects argues for a closeness and intimacy between the virtual and the material realities of both the Moon and the hybrid media object that is *The Book of Luna*. The virtual can be identified as an extensive field of potential objects that “orbit” around concrete objects. Pierre Levy places the origins of our current understanding of the virtual in the scholastic *virtualis*, the virtue or power of something to evolve into its proper form. For example, the tree already exists virtually in the object seed that it grows from (concomitantly, the seed is also a virtual double of the tree). Levy sheds the Aristotelian origins of this concept to argue that the virtual is the effect of introducing indeterminacy, movement into the actual – not by imagining arbitrary alternatives to it, but by “discovering the general question that (an actual moment) refers to” by discovering the unfinished aspects of its identity. [1] In the course of the process of “virtualization,” the concrete object is opened up, its identity put back into play. It is transformed into a new individual, but one that emerges in response to what the object was before. The perceptual effects orchestrated by *The Book of Luna* virtualize our experience of Moon in exactly this way: the manner in which something appears – an effect of light, a mechanical movement, a pattern of objects on display, an animated transformation – puts into question the way things usually are.



Fig. 1. *MetaBook: The Book of Luna*, 2014, Clea T. Waite & Lauren Fenton, Interactive, mixed multimedia object, 65x40x85 cm. Photo © C.T. Waite 2014.

Although the virtual is, as Levy remarks, “not there,” intangible, in seemingly unarguable opposition to the material, others, most notably Henri Bergson and later Gilles Deleuze have argued that the virtual is in fact a fundamental aspect of the experience of our perception of the material world. Because perception is never a straightforward act in which the subject comes to apprehend objects as they are – filtered instead through our specific perceptual apparatus, brought into focus by our selective attention and

expectations – objects can be understood as “images” of themselves. We are always experiencing the virtual “doubles” of the things around us. To consider the object “encased” in its historical context, interconnected with layers of events outside our immediate apprehension, is to take into account the object’s tangible virtual existence. By staging the Moon in multiple electronic spaces threaded across a physical cabinet, one plunges, through an exercise of deep perception, “into the past as if it were a proper element,” into the history of the Moon-object. [2] The virtual here is an element, a tangible, sensuous medium in which we encounter the different spectral existences of the satellite.

Projected onto the glass globe is a three-dimensional computer model of the Moon which the reader can investigate minutely through a virtual lens that wanders across the surface of the model, revealing original film recordings of the Moon’s surface made from orbit by the Apollo and Kaguya/Selene missions, synthesized into a three-dimensional, dynamic collage. This exploratory experience compounds the uncanny and almost magical impression created by the luminous globe suspended in its dark compartment. In a seductive moment of suspended disbelief, it appears the Moon has been “captured” in a box in its phenomenological entirety, in such a way that the reader can peer, as if into a microscope, at the marvelous detail of the lunar surface. This perceptual inversion, which makes the Moon feel smaller than us, creates a feeling of slightly vertiginous intimacy with the celestial object. The orbital footage, drawing attention to the lunar surface textures and irregularities whose revolutionary discovery was made possible by the telescope, is manipulated to simulate the primitive optics of Galileo’s original telescope from 1609. The real lunar imagery is composited onto the computer model in real-time and projected onto a translucent glass globe using a fish-eye lens and image mapping techniques like those currently employed in digital full-dome planetaria (Fig. 2).

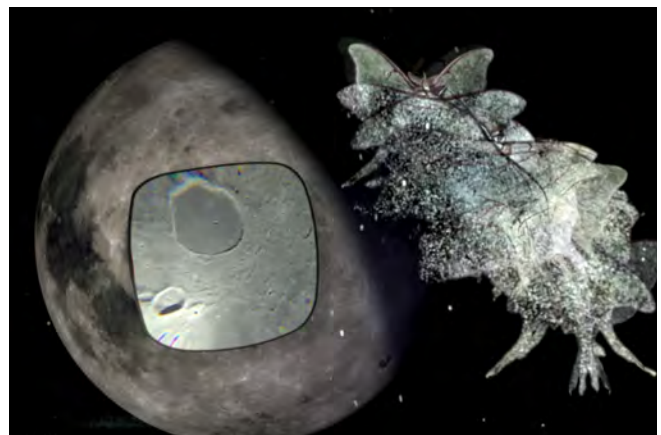


Fig. 2. *MetaBook: The Book of Luna*, 2014, Clea T. Waite & Lauren Fenton, Interactive, mixed multimedia object, 65x40x85 cm. Image © C.T. Waite 2013.

The glowing orb of the lunar projection is additionally layered with animated films that employ historical space flight footage as well

as illustrations and diagrams from the works of earlier lunar philosophers. These phantasmagorical apparitions float in space using the Pepper's Ghost technique. A theatrical effect that dates from the mid 19th century, the Pepper's Ghost image is produced by reflecting an illuminated object or in our case, films on a separate screen mounted in a hidden compartment, in a transparent half-silvered mirror placed in front of the Moon's globe. The result is a seamless, hologram-like effect that gives the impression that the animated images are moving through and around the surface globe within the compartment, generally making it impossible to distinguish between background and foreground, the projections and the solid glass globe on which the moon is projected. Fact and fiction – the archival footage, the map, diagrams of lunar orbits, narratives of lunar journeys and other content – intermix freely, reflecting the Moon's own history as an object of scientific and poetic speculation, two modes of investigation that dissolve into each other and alternate along the atemporal continuum of the celestial object.

The third projection housed within the cabinet's compartments presents an interactive, scrollable cutup poem composed of quotations from each of the lunar philosophers (Fig. 3). The effect of this poem-montage recalls Walter Benjamin's encyclopedic compendium on the Paris arcades, which also evoked the sensorial and emotional contours of a physical space through the fragments of the voices of those who had explored them. An assemblage of these musings, scientific observations transmuting into ethereal speculations, show the breadth of the Moon as a concept – a satellite that doubles as the center of a web of human projections. Some of the quotes featured in *The Book of Luna* text seem to refer to this phenomenon, imagining the Moon as a the place where the aspirations and desires of humanity find their final home or as the final argument in a vision of a mathematical, mechanical universe: Eppur si muove [...] and yet it does move. We can use the ratio of anomaly demonstrated for us by the Moon's syzygies, for their eclipses are found likewise to agree most completely with our hypotheses. The substance of the soul is left upon the Moon and retains certain vestiges and dreams of life as it were. The tears of lovers and their endless sighs, the moments lost in empty games of chance, vain projects none could ever realize, the fruitless idleness of ignorance and unfulfilled desire – which occupies more room than all the rest and more expanse: in short, whatever has been lost on Earth is found upon the Moon, for what it's worth [...] for what is the Moon that it haunts us, this impudent companion immigrated from the system's less fortunate margins, in the realm of dust collected in orbs? Nothing but space, time, matter and motion, where of young moons begin. The elements of number are the elements of all things and the whole heaven is a musical scale and a number. Chasms of azure, wells of fire perhaps [...] behold the moon as she is in herself: her magnitude and beauty and nature, which is not simple and unmixed but a blend, as it were, of star and earth [...] singular satellite, the Moon turns its clockwork dream. She practically grazes the earth and revolving close to it whirls like a chariot's axel-box about. [3]

The act of scrolling and reading the poem functions as an interface to the projection of the Moon on the globe, which rotates to the location of the crater named after the philosopher whose thoughts appear at that point in the text. Navigating the topology of the Moon with the joystick will also activate the *MetaBook's* narrative elements, taking the reader to different places in the scroll of text. While the design of the joystick evokes the navigational instruments of the space age (specifically the joystick used to dock the lunar module in the Apollo missions), the crank used to scroll through the text evokes the technology of Antiquity, bookending the historical period referenced in *The Book of Luna*.



Fig. 3. *MetaBook: The Book of Luna*, 2014, Clea T. Waite & Lauren Fenton, Interactive, mixed multimedia object, 65x40x85 cm. Photo © L. Fenton, 2014.

ASSEMBLAGE AS MONTAGE

Erwin Panofsky defines cinema as “an art that dynamizes space and spatializes time.”[4] The cinematic composition of the *MetaBook* relies upon the concept of structural montage, one which transposes the linear-sequential progression of the narrative, one scene after the next, into a multivalent, non-linear presentation of the “scenes” using spatial distribution. This system of elements relates back to the experiments of the early, European avant-garde cinema of the 1920's and Sergei Eisenstein's

concepts of juxtaposition and the collision of cells in “montage as the chief means of effect.” [5] The juxtaposition of cells – short, metaphor-latent shots, is essential to Eisenstein’s notion of montage: “*The montage method is obvious: the play of juxtaposed detail-shots, which in themselves are immutable and even unrelated, but from which is created the desired image of the whole [...] Neither a successive mechanical alternation of cross-cuts, nor an interweaving of agnostic themes, but above all a unity, which in the play of inner contradictions, through a shift of the play in the direction of tracing its organic pulse – that is what lies at the base of rhythm. This is not an outer unity of story, bringing with it also the classical image of the chase-scene, but that inner unity, which can be realized in montage as an entirely different system of construction, in which so-called parallel montage can figure as on the highest or particularly personal variants.*” [6] By departing from the impulse towards two-dimensional, linear realism, the poetry of cinema emerges through the associations created by spatial juxtaposition. The *MetaBook* extends this notion of cells and juxtaposition outwards into an architectural space filled with evocative object-cells that resonate with the cinematic shots to form an immersive, structural composition.

Signification in the *MetaBook* stems from the motivation of moving between the different “attractions” of the wooden cabinet and is composed by the reader through the linear flow of her attention. An information feedback loop is established between the two-dimensionality of the text, the three-dimensionality of the lunar model and the somatic, shared space of the object and the participant, engaging varying modes of perception and cognition. Dieter Daniels has analyzed the artwork of the Surrealist Marcel Duchamp using the criteria of contemporary new media art practices. He writes: “For Duchamp the artwork is, so to speak, a sensual interface between the intellect of the artist and of the viewer; the message must pass through the physical stage.” [7] With his work *La boîte verte. La mariée mise à nu par ses célibataires, même* (*The Green Box. The Bride Stripped Bare by Her Bachelors, Even*) (1934), Duchamp created a textual extension of his seminal artwork *Le grand verre* (*The Large Glass*) (1915-1923), producing the *Green Box* out of a collection of all the notes that he made in developing *The Large Glass*. The two works, text and object, depend upon the feedback loop of mutual cross-referencing to make sense of the other. One must read the notes in the *Green Box* to decipher the complex symbolism in the *Large Glass*, which in turn have no context without their object of description. Daniels describes Duchamp’s *Green Box* as captivating the viewer “via its countless links through the notes, within which he moves in no firm sequence as through a hypertext.” [7] The *Green Box* as a transmedia augmentation of the *Large Glass* presents a non-linear narrative in the form of an intellectual navigation between the text and the object and back again in a cyclical feedback loop of looking, searching and reading. The *MetaBook* activates the same notion of non-linear interaction between object, text and reader via its structural montage and somatic navigation.

This approach to somatic montage harkens back to the artwork of Joseph Cornell, whose compositions hinge on the manner in which the connotations evoked by common objects can ricochet off of each other to create an immersive and powerfully evocative web of material signifiers. A one-time assistant to Duchamp, Cornell’s assemblages are comparable to poems; condensed, rhythmic constructions of metaphors that evoke our emotions and reflections. His constructions can be viewed as spatial cinematic objects, cine-boxes in the sense of “cine-” defined as “combining form.” His constructions of juxtapositions and correspondences evoke Eisenstein’s notions of montage as static moments of cinematic expression. The openness of his iconography allows an affective dream-space of associations to emerge that are structured by the logical codification, the rationality of the enclosing boxes in a combining of forms. In *The Book of Luna*, we pay homage to Cornell’s approach to recontextualizing language, image, object and the interaction of the elements into a synthesis of juxtapositions and sensorial experiences that comprise the total vocabulary of a work. In particular, our composition of the various compartments that compose the *MetaBook* constitutes an echoing chamber for the lunar history referenced in the scroll, the three-dimensional map and the Pepper’s Ghost apparitions. A miniature chamber of paneled mirrors endlessly reproduces the telescope in its center. A room wallpapered with fantastical designs for measuring instruments from the *Age of Reason* encloses a book opened to a diagram of lunar orbits that is only visible with the aid of a magnifying lens. Crystalline objects representing Kepler’s solids are juxtaposed with *The Great Moon Hoax* of 1835 and its vivid depictions of lunar civilization. An enclosed compartment reveals a solitary Lunockod, the Soviet lunar lander, in a landscape of gray regolith, made vast and distant by peering into a concave lens, while, in the vertical compartments on either side of the Moon, a clock and an astronaut are suspended in blackness, framing time and space (Fig. 4).



Fig. 4. *MetaBook: The Book of Luna*, 2014, Clea T. Waite & Lauren Fenton, Interactive, mixed multimedia object, 65x40x85 cm. Photo © L. Fenton, 2014.

FOLDING INTO THE WUNDERKAMMER

Distancing itself from the tableau-like perfection of the Surrealists' compositions, which subsume the identity of each object into a single "cell," *The Book of Luna* produces these vignettes as a series or montage, drawing attention to the singularity of each compartment and its role in the distributed narrative. In this sense it evokes the 17th and 18th century cabinet of curiosities, which displayed heterogeneous arrays of found and crafted objects in purposefully open-ended orders and taxonomies. The cabinet of curiosities collected the contents of the world as a means of re-creating it, in its original, marvelous complexity – to represent nature not in its typical state but at "peak intensity and creativity" [8]. In order to do this, these *Wunderkammern* followed a synecdoche logic that allowed their users to explore an immensity of materials that appeared to exceed the scale of the cabinet itself. The cabinet would have a recursive structure, like a Russian Doll, with spaces containing ever-smaller spaces. This effect is mirrored in the chains of association created by the cabinet's contents, which stand in for the connection between the bodies of knowledge that contain them. To recall Deleuze's description of Baroque art and its logic of the "fold," the cabinet of curiosities conjures its own series of microcosms in which matter becomes porous, a series of caverns within caverns. [9] Through this image, Deleuze embroiders on Leibniz's original concept of the material universe as a "plenum," a state of infinite density, in which a body is connected to all other bodies through the successive action of series of bodies upon each other. Mirroring the structure of the universe, the Baroque logic of the cabinet of curiosities re-creates the plenum in miniature, unveiling each object as merely the visible skin enclosing entire worlds: "Every portion of matter can be thought of as a garden full of plants or as a pond full of fish. But every branch of the plant, every part of the animal and every drop of its vital fluids, is another such garden or another such pool." [10] Through an act of imagination that allowed her to reconstruct the cosmos from a collection of intriguingly distributed objects, the spectator could obsessively excavate the materiality of the world whose density would otherwise remain impenetrable to the naked eye. In a similar fashion, *The Book of Luna* gathers up and unfolds the object of the Moon and the body of lunar knowledge amassed by its admirers.

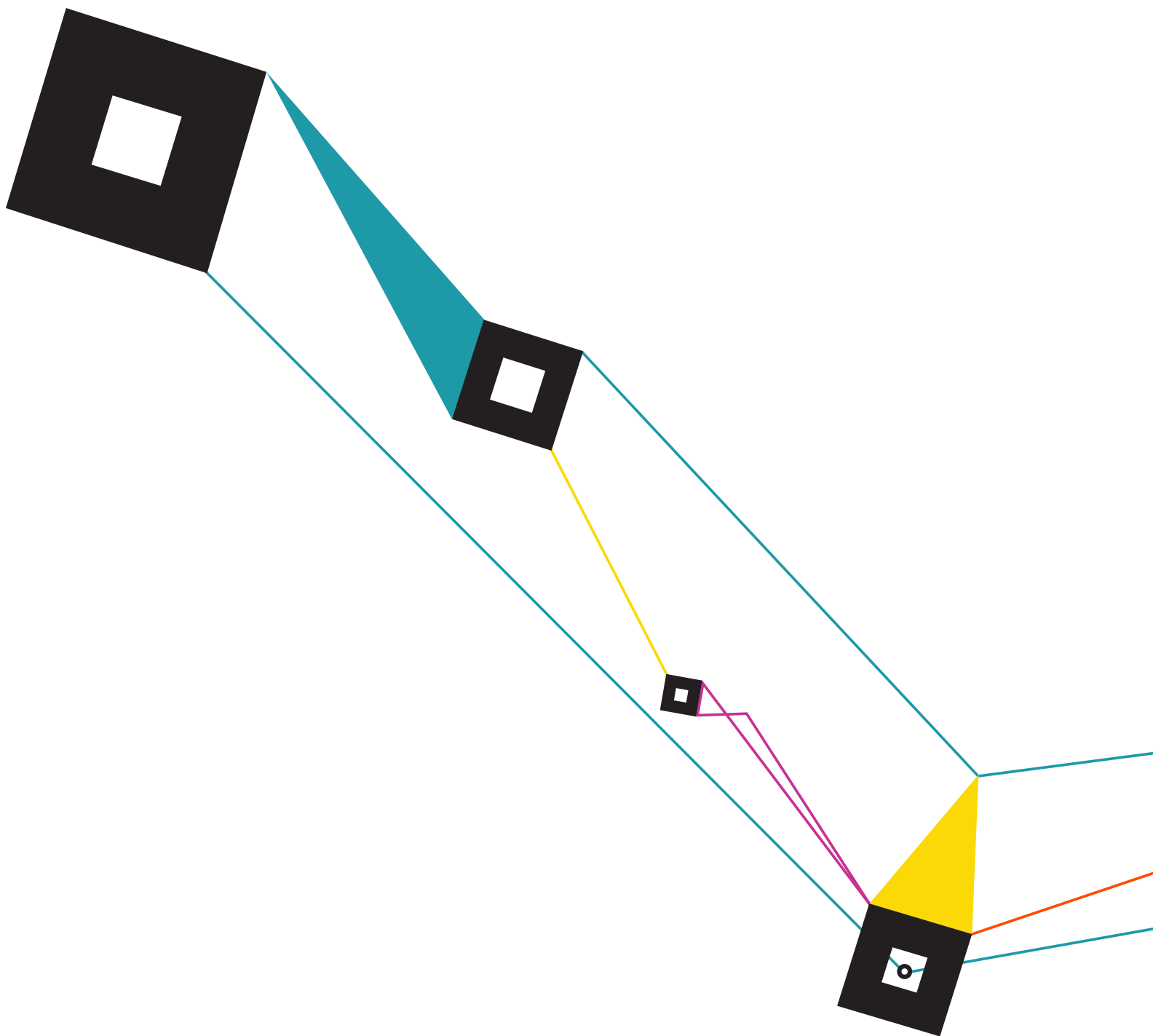
CONCLUSION

Concepts, metaphors and formal approaches migrate across artistic media. Assemblage works like Cornell's boxes demonstrate a gestalt expressing the concepts that were developed in Soviet cinema. Eisenstein himself referred back to poetry, especially haiku, as a metaphor for montage. He calls the lines of the haiku "montage phrases. Shot lists." Eisenstein quotes Yone Noguchi "it is the readers who make the haiku's imperfection a perfection of art." [11] The film theorist David Bordwell similarly talks about the use of montage as the fragmentation of space to build an emotional impact, "a meaningful totality out of fragmentary shots." [12] Poetry, montage, assemblage and the *Wunderkammer* can all be seen as manifestations of the same idiom of fragmentation

and juxtaposition in different media. As forms of expression, such structures compel the mind to fill in the lacunae, communicating within the conceptual negative space. In the *MetaBook*, the viewer's proprioception, her own sense of her body's relationship to the piece and interlocked spaces are used as compositional components that supplement two-dimensional sequentiality in the construction of a cohesive poetic narrative. A text, a film and an interactive assemblage form a woven, virtual topology of a non-linear account of a curious Moon.

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STREAM 2

LOCATION/SPACE



BECAUSE I AM NOT HERE, SELECTED SECOND LIFE-BASED ART: DUAL SUBJECTIVITY, LIMINALITY AND THE INDIVIDUALLY SOCIAL

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ABSTRACT

Second Life is a virtual world accessible through the Internet and in which users create objects and spaces and interact socially through 3D avatars. Certain artists use this platform as a medium for art creation, using the aesthetic, spatial, temporal and technological features of SL as raw material. These artists, their avatars, code and script applied to animate and manipulate objects and artwork in SL have been the center of my research for a number of years now: what does virtual existence mean and what is its purpose when stemming from aesthetic exchange in SL? Through a qualitative research method mixing distributed aesthetics, digital art and media theories, I examine aesthetic exchange in the virtual: the shifting patterns of subjectivity, identity and avatars as reflected in the artwork of Gazira Babeli, Bryn Oh, Eva & Franco Mattes and China Tracy (Cao Fei). I also reflect further on how artists create and embody avatars, produce liminal identities, dual subjectivity and *mythopoeia*, experiencing oneself as 'another,' turning liminal subjectivity-construction into artists' resources, synthesized in the paradoxical image of the *Individually Social*. This paper presents a synthesis of the methods, findings and conclusions of research on both these aspects.

BECAUSE I AM NOT HERE [...]

Second Life (SL) is not a conventional online computer game; rather, it is a MMORPG (massive multiplayer online role-play game) or a social experiment in the virtual, in which its members, known as residents, are provided the tools and basic knowledge to create objects, spaces and content.

The understanding of identity playing and appearance of avatars in SL, the way they create objects and spaces and how they develop the capability to relate to others and create content, is an essential goal of virtual aesthetics research. A complex dynamic, unfolding in SL, weaves structures of subjectivity, identity, social, economic and emotional exchange, both in real and virtual life. Unlike other virtual environments, SL virtual characterizations are, from the beginning, under the resident's control and creativity. It is precisely the capability of modifying and constantly reinventing an avatar's appearance and 'personality' that is the hallmark of SL's ability for experimenting with virtual identity and subjectivity and, by extension, the displaying of interactive, aesthetic and meaning-making experiences, whose design, exchange and trade grows in direct proportion to the experience of virtual embodiment, social performance and presence projected in the virtual self and the multiplied *personae* of the avatar. An important finding of my research is that an avatar's identity relies on a particular sense of liminal and multiple 'selfhood' developed through digital manipulation, representation and aesthetic exchange, all enacted by an amplified and mutable subjectivity. This is the notion of

distribute aesthetics applied in my study [1]. In this sense, identity becomes augmented (not fractured), negotiated and shaped through the exchange between avatars and people in both the actual and the virtual worlds to form a hybrid 'personality' to such an extent that may impact the actual reality. [2]

What is more, interacting with others catapults to the surface a number of aspects highly related to "impression management" [3] and, with them, a dense dynamic involved in the exchange of meaning-making, self-image representation and behavioral experiences. In my work, a central ontology of SL deals with presence, subjectivity and identity in virtual worlds, causing embodiment and agency processes to lie in a liminal state between self awareness and semi-subjective perceptual features. All of these stem from intra-to-inter-subjective transferences between the avatar and his/her actual owner in real life. Additionally, these factors become enhanced by the environment in which avatars 'live,' interpenetrated by powerful digital communication channels (Web browsing, chat, SMS, voice, video, etc.) that also contribute to reshaping presence, subjectivity and identity in SL. Therefore, interactivity, persistence and the capacity to share with others in a common virtual space – while actual life (AL) individuals may be located in opposite corners of the earth – contribute significantly to the liminal feeling of being (oneself) immersed as *another self* in a three-dimensional persistent virtual space.

This happens despite SL's relatively low resolution (or draft) representation of avatars, objects and spaces. The sensation of being immersed creates a surprisingly powerful, psychologically enticing and semiotically meaningful result. It is therefore clear that emotional and affective factors are involved in the feeling of presence, agency, self representation and action in virtual worlds. In the last ten to twelve years, specialized VWs research has reported the extent to which synchronous reactions, behavioral and psychological responses are elicited by user interaction. [4]

Since there is no specific plot, goal, score or rules to follow, portraying SL as a game would be misleading. It is a social environment extending and stimulating the conditions to perform and embrace a parallel virtual life, merged with our actual experience of the metaverse. Hence, my research emphasizes how the meaningful achievements in SL's social, economic, cultural and personal interaction are symptomatically goal-oriented activities that are dependent on the avatar's personality, narratives or, to borrow a more accurate term from Paul Ricoeur, their "emplotment." [5]

Goal-oriented activities are propelled by the persistent nature of SL's three-dimensional space, its navigability and the hyper-

communication tools at hand, stimulating the mutability and enhancement of presence, subjectivity and the illusion of being immersed in non-mediated experiences. This is the definition of the metaverse applied in my work. However, in Linden Lab's words (the company that launched, owns and has run SL since 2003), the mainstream objective of the platform is the creation and maintenance of social networks, the edification of a virtual society through the objects, spaces and narratives necessary to populate it: a collection of 'cultures' designed and shaped at residents' will.



Fig. 1. *Lacan Galicia's Living Room* (Lacan Galicia is my avatar), 2012, Personal Screenshot in SL © Gerardo Toledo.

Unlike this view, I entertained a different perspective in which responsiveness and self-representation – assumed as a flow of narrative-creation-to-self-experience dependent on extended dual subjectivity – are actually 'testing' the limits of private and social virtually-represented *personae*. My research applies a combined perspective as a valid mode of virtual, media and distribute aesthetics analysis, bound to explain and enlarge our notions of the virtual, contributing to reshaping our own epistemologies of digital media and virtual worlds theory.

THE AUGMENTED SELF AND AN ONTOLOGY OF THE METAVERSE

The notion of the augmented self is drawn from Italian new media, semiotics and film specialist Adriano D'Aloia's concept of "autoempathy." [6] I affirm in my work that auto-reflexive empathy comes earlier than social bonding in the form of an affective sequel targeted, primarily, to ourselves when experiencing our one-self as another: an 'avatarian' multiple identity. In other words, I am referring to distributed aesthetic experiences becoming vital and subjective in a meaningful second virtual existence. Accordingly, my research on certain forms of SL artwork witnesses an almost ideal scenario for analyzing these questions: virtual identity, behavior and liminality combined. In former research, I examined the features, behavior and ethos of four avatars creating art in SL: Gazira Babeli, Eva & Franco Mattes, Bryn Oh and China Tracy (Cao Fei). These are the names and virtual identities of SL avatars, except for China Tracy, who deliberately maintains her actual identity (Cao Fei) associated to that of her SL avatar.

The ontology of the metaverse that I apply in my work reveals both the hyper communication tools as well as the identity and subjectivity patterns created within the liminal as being key to deepening the relationship between avatars and actual selves. In my four case studies, the artists' virtual identities account for augmented, multiple and transformative processes of self-perception, subjectivity, narrative creation and aesthetic exchange running from SL to AL and vice versa. In all four cases the process of *dual subjectivity* (DS) is a common – liminal – threading-element.

DS is defined as the merging of computer or *machinic-subjectivity* with *human-augmented-subjectivity*. [7] In the context of aesthetic exchange in SL, this manifests as an augmented, metamorphic and reversible path-creation, oscillating from the intra-to-the-inter-subjective *personae* in the avatar and its actual owner. This ultimately means that a complex form of self-acknowledgment, between the virtual and the actual worlds, unfolds earlier than mere sociability. According to D'Aloia, autoempathy, takes place in SL even before the creation of social bonds: "We see a condensation or saturation, of the Self, to the detriment of the presence of the Other. Especially, online virtual worlds are environments where the player fundamentally experiences, almost auto-erotically, his/her own ego. The interactional axis hovers on the Selfness side and the intra-subjective logic is stronger than the inter-subjective one. [...] Visual and sensorial perception oscillates between two declensions of the same Self. And if the actual Self is more concerned with empathising with the virtual Self than with the Other, then empathy is required only as a reflexive ability. In such auto-reflexive environments, in which users need to engage a motional and emotional relation first and foremost with themselves, a form of autoempathy emerges." [8]

In other words, a complex process advances forcing the avatar to enter into a liminal, discursive negotiation with him/herself and with the actual person on 'this side of the screen.' Especially because self-representing our self as another self demands a perceptual and affective relocation of both private and public *personae*. Within this framework, I elaborated a key perspective that sheds an alternative view on the virtual as a techno-cultural process, attesting to the emergence of human and *machinic-subjectivity* in the avatar, preceding two dynamics lived in the virtual: dual immersion and dual subjectivity.

These constitute the affective-subjective foundation upon which virtual liminality acquires its constitution as both an epistemological and aesthetic process between perceived realities. An avatar's artist immersed in SL becomes a true "actant" thanks to autoempathy's fuzzy limits between the calculated (or intuited) self-narratives on the side of the avatar-performing-as-artist and the merging of private and public personalities, when the actual self – represented as a virtual one as another – interacts and performs socially. [9] Hence, the aesthetic exchange lived by a virtual self, auto projected as an artist (and another self) is

fundamentally a liminal experience. In other words, an avatar becomes simultaneously three things. First, it becomes an enunciator in semiotic terms, as dual subjectivity constitutes a non-fixed, enigmatic, pivotal point from which it is possible to emit distributed aesthetic forms of the self (represented as another self). Second, it becomes a character in an unfolding self-narrative (a plot) because those forms ultimately express the merging of subjective, social and sense-making structures, which are necessary for self-agency, the creation of the narratives that sustain it and the embodiment of the performing personae by the (artist's) avatar and vice versa. Third, it becomes a reflective/reflected spectator of both processes, because, under these conditions, embodiment implies a liminal continuous relocation of the self as another virtual self.

According to my findings, autoempathy and liminality are the true bearers of an avatars' ability to generate, circulate and simultaneously transfer subjective content, interacting online/offline with an audience and projecting themselves as an augmented-other. From there, threading augmented and hybrid 'instances' of avatars and actual personae allows for the formulation of the paradoxical term I have referred to as the *individually social*. This is the subject critically addressed in the chapter "Individually Social: From Distribute Aesthetics to New Media Literacy. Approaching the Merging of Virtual Worlds, Semantic Web and Social Networks" in *The Immersive Internet*. [10] In the book, a number of scholars and researchers envision a merged technological scenario for the future: a networked universal space inhabited and 'browsed' by standardized 3D avatars, dispossessed of their rich augmented subjectivity, who are, nevertheless, able to communicate between different virtual platforms.

DISTRIBUTE AESTHETICS AND SL – BASED ART

I have examined these subjects from a relatively innovative research method centered on qualitative inquiry, case studies and a mix of analytical perspectives from distributed aesthetics, VWs theory and media studies. Every time one (self) performs in 'avatar mode,' a double affective operation on its perception and interaction in both worlds takes place. The avatar-body is the means through which a SL resident becomes an actant, representing, in semiotic terms, a "position' in both physical and enunciations meaning." [11] This happens because of the development of a particular sense of presence: that of being there as another oneself, which implies an extension of the actual self. On the other hand, the relationship is performed through a dual actant 'who' precipitates and amalgamates identity and uniqueness in a continuum, so "the recognition as oneself does not neglect the relationship between the self (as another oneself) in the virtual, with the self-other (otherness) in actual life." [12]

However, in the case of SL—an environment categorized by a semi-subjective visual frame – the dual actant also interferes in the relationship with the other. The reason being that these aspects accrue to one essential topic in digital aesthetics: the original

versus copy. Aesthetics analysis, virtual art and digital media research are best explored and built departing from the remarkable property of digital images to reproduce multiple versions of themselves that work as 'originals,' resulting from the inherent invisibility of the source code. This is an unavoidable fundament for examining the digital image and distribute aesthetics and indeed is of particular importance on VWs research. [13]

This view emphasizes critical functions of performativity and shared meaning-making and the affective exchange from the dual – individually social – actant who creates, enhances and weaves narratives, identity and subjectivity patterns, constituting what Anna Munster (and others) call a *space of reciprocity (SOR)*. Munster in particular affirms that SOR is absent from mass media. The relevance of this idea is, on the one hand, a call for a strategic contribution to the theory of digital aesthetics from a media studies perspective. On the other, it confirms the mutation of "digital non linear temporalities" that, according to Munster, constitute a radical shift in the digital image's regime, as time (real) is virtually superseding distance (real space). Following this path, Munster has developed a (Deleuzian) conception of embodiment as a different arrangement of lines of expression bound to interpret the effects of coding on the homogenization occasioned by the image body's components when translated to the digital order, thereby creating a complex specialization. [14]

Considering Boris Groys' term *topological aura*, in his chapter "Art in the Age of Biopolitics" (2008) he traces a parallel between Walter Benjamin's notion of aura and the issues of representation, documentation originality and copy (reproducibility) of the digital image. According to Groys, a different, presumably more specific sense, in which the concept of aura is used, arises from a closer reading of Benjamin's text. [this] "makes clear that the aura originates only by virtue of the modern technology of reproduction – that is to say, it emerges in the same moment as it is lost. And it emerges for the same reason for which it is lost." [15]

This is what Groys calls the "topological aura" of digital images; the idea that, through its inscriptions, aura transforms itself into the relationship of the artwork to the site in which it is found: "The important realization is that for Benjamin the distinction between original and copy is exclusively a topological one – and as such it is – entirely independent of the material nature of the work." [16] This is of particular importance for the theoretical framing of this paper, because SL operates as a liminal space proliferating a differential of topologies. Differently put, it operates not only as the site of creation, display and dissemination of art objects, but also as the liminal 'engine,' transforming its aesthetics (affecting between worlds) and the technical yet mythic place of their reproduction, thereby demonstrating how the "technical reproduction as such is by no means the reason of the loss of aura." [17] This formulation precedes the development of the important theory of digital image as "documentation," that is, as part of a vast movement anchored in art theory, aesthetics and bio

politics. In my case, this is precisely the point at which performances, installations, narrative and participative art in SL work as forms of documentation (a property of digitalized information firmly sustained by its tools), engendering “strategies for making something living and original from something artificial and reproduced.” [18]

Consequently, the digital image reproduces not only a copy from an original source that remains invisible and particularly in SL-Based Art, we may say that there is “no such thing as a copy. In the world of digitized images, we are dealing only with originals – only with original presentations of the absent, invisible digital original.” [19] Hence, one should consider that every time we are exposed to the digital image, we are truly looking at a digital copy that has no visible original and that the visualization of the image is an original event in and of itself. A digital image, to be seen, says Groys, should not merely be exhibited, but “staged or performed.” Accordingly, one can say that “digitalization turns the visual arts into performing art” in which subjectivity, narrative and avatar’s multiplied selfhood becomes liminally, yet systematically, embedded. [20]

In this sense, the idea of extending one’s subjectivity into an augmented self ‘as another’ in virtual worlds, takes on aesthetic and epistemological relevance because the incorporation of one’s body into our avatar is not just a psychological, perceptual operation but, in essence, a topological, narrative one. For the sake of brevity, I will comment here only about the artwork in two of my cases: *Gazira Babeli* and *Bryn Oh*. However it is worth mentioning that the other two (*China Tracy* and *Eva & Franco Mattes*) seemingly fall within the same coordinates. We and our avatars create the conditions and narratives for our digital incarnation to function as a real (virtual) self, making possible the inscription of reality and life, which is essentially artificial. Whether consciously or not, intentionally or not, our avatars act under a regime of subjective narratives around a former fiction: that of representing our self as one that is essentially another self ‘who,’ nevertheless, creates a hybrid narrative. This is because the liminal dimension threads a whole process of interaction, heavily loaded into digital objects, spaces and social networks created by the virtual beings that populate it.

FOUR CORNERS MAKE A PENTAGON

The artists examined here assume, negotiate and apply their art to subjectivity construction, liminal identity and multiple *self* embodiment. Due to their critical position on SL, they are on a quest for virtual/actual aesthetic exchange, catalyzing a new emerging SL *ethos* in which individual and subjective content is socially produced and disseminated, but still emanates primarily from liminal and auto emphatic patterns. The artists express a set of mutable and proliferating realities lived in the liminal, presenting themselves as artists in the virtual while in many cases concealing their AL identities or playing pranks at different levels with the liminal connections between identities. In this regard, their artwork, aesthetic statements, augmented subjectivity and identity experiences enact and perform dual subjectivity (and immersion)

while at the same time the “technological hyper subject” is aesthetically projected. [21] I have approached this by analyzing the artists’ idiosyncratic *modus operandi*, art statements and *mythopoeia*. This latter meaning the personal but powerful narratives emerging from their own liminal identities and the exceptional condition of behaving like one self who performs through two (or more) bodies – one in the actual, one in the virtual – that nevertheless ‘respond’ to an actual mind.

In this sense, from the mixed perspective in my case studies, the artists represent four ‘corners’ that conform, metaphorically, not to a square but a pentagon: a fifth corner arises directly from the intermedial, aesthetic and liminal ‘substance’ amalgamated by dual subjectivity and the paradoxical and omnipresent self-reflexive practices of the technological hyper subject. Such is the epistemological fundament of the term individually social, as ‘a’ necessary condition of autoempathy, coalescing into the multiple selfhood via machinic and doubled subjectivity.

GAZIRA BABELI

“I can walk bare feet, but my avatar needs Prada shoes.”

Gazira Babeli

Nobody knows who is behind the ‘female’ avatar wearing the tall black hat and sunglasses who likes to be called ‘Gaz.’ Her identity in AL remains deliberately unknown. Is there one individual? Several? What gender? Is it a group of genius hackers and pranksters? A cutting edge artificial intelligence bot disguised as an avatar? There are no answers to these questions, although one thing is evident: ‘Gaz’ reveals an abundance of dark humor, top-notch programming and computer skills and a sort of nihilistic-irony disguised as *joie de vivre* in avatarian terms. Her work points to a defined aesthetic claim in favor of illusion and ‘magic,’ that is, the power of code capable of prompting life in the artificial. Gazira emphasizes this in the construction of the idea of the real as virtual because only through “tekhne” and “episteme” [22] is one able to elevate an idea of the virtual embedded in the actual. Gazira’s SL performances and interventions demonstrate this, explaining why she can be at once a systematic, ferocious and caustic character and yet cool, generous and funny. So, it is thanks to illusion and representation that one senses the virtual as a manifestation of the ‘real,’ and vice versa. The realness of the virtual is apprehended mainly through its technical representation and cultured illusion, in the same sense that our cultured views allow for conferring a degree of reality to dreams, fantasies, epiphanies, literature and poetry. Gazira Babeli’s code performances, interventions and *machinima* constitute a vector of illusion and representation transformed into the true bearers of continuity between the real and the virtual worlds.

This understanding stems from her exemplary work *Acting as Aliens* (2009): visitors (to the Kapelica Gallery in Slovenia) are subtly projected to a context in which the only possibility to connect with the absent (although not disembodied) artist, is to start acting

as an avatar (an alien). Real (actual) people become seduced, following at a distance actions, movements and directions provided by Gazira, the SL avatar-artist. In a genius transference of subjectivities and alternate bodies at play, Gazira accomplishes something fascinating: real people in the gallery become transformed into 'actual avatars' controlled by a virtual avatar in SL who, at the same time (and hidden somewhere), displays the current action to other people (in SL) who are now transformed into other 'residents' in the actual world in the gallery's computer mirrored-screen. When interviewed by my avatar, Gaz affirmed that imaginary realities are always part of our deal with the cultured representation of the world and that one does not need to escape from the real just because tangible materiality becomes differently patterned through code. Gazira's art is an enticing opportunity to experience the extension and re-materialization of the body in the digital at a symbolic level through the virtual, but real as illusion.



Fig. 2. *Acting As Aliens*, 2009, photo Miha Fras © Gazira Babeli's Website.

BRYN OH

"When someone falls in love in SL, they fall in love with another mind, not with a cartoon character."

Bryn Oh

I consider the fact that Bryn Oh is a traditionally-trained oil painter to explain her obsession as a virtual artist. It also explains the prominence she confers to visual composition, among other sensorial and perceptual referents. In her interview with Lacan Galicia (my avatar) and within her copiously maintained media-presence (BlogSpot, YouTube, Vimeo and *machinima* sites) she emphasizes the 'superior' qualitative ranking introduced in art by compositional order. [23] Bryn is able to apply this notion as a direct outcome of mathematical harmony and classical composition techniques to attract attention and 'guide' the visitor's gaze. That does not imply that she neglects the power of intuition, lyrical spirit and emotional or even darker and turbulent imagery. Rather the contrary: Bryn is a lonesome character that aesthetically turns the conditions of liminality, privacy and self-containment – primary of her own personality and temperament – into a powerhouse.

Bryn supplies stories that become transformed into interactive virtual installations, scripted sculptures, intriguing and ambiguous 'toys' and *machinima* productions that flirt between private and

subjective realms on the one hand and shared and collective ones on the other. *Immersiva* Island, the artist's exemplary artwork, is a SIM (VW simulator), a fantasy telltale, a mutable 'city,' where proliferating stories become transformed into surrealistic plots, underlying the architectural, spatial and temporal poetics of those visitors interacting with Bryn's creations: sculptures, rusted robots and ill-toy-characters, fantastic machines, cybrid-characters and abandoned spaces. What Bryn seeks is to share her fantastical inner imagery and telltale skills, dreams and melancholic atmospheres through poetic discourses that adopt both visual (three-dimensional and interactive) and textual forms. These are profoundly woven into her delicate yet effective and detailed sense of composition. Just entering Bryn's *Immersiva* one becomes integrated in the dynamics of a poetic flow, unfolding from the series of objects, characters and situations that open their full poetic potential only in accordance with the visitor's degree of interaction, focus, curiosity and tenacity. [24] More than seeking to conduct or anchor our interpretation, she looks for the multiplication and rearrangement of possible articulations, to which the visitor can append her own affective receptivity, poetic and intellectual interpretation.



Fig. 3. Lacan Visiting Virginia in "*Virginia Alone*," *Immersiva*, 2011 © Gerardo Toledo (Personal Screenshot from SL).

For this reason, her bucolic and morbid atmospheres are populated by talking, interactive and narrative devices, ready to lead the viewer, at the request (and effort) of the patient and curious visitor, to new levels of interaction and narratives around phantasmagorical and personal subjects: 'infantile' items and narratives of memory, all melancholic spirits wandering in the dusk or at night on the borders of the real, the surreal, the virtual and the oneiric. This is Bryn's approach to desire, an arrangement of oneiric contexts created by her poetry and virtual installations, expressed through scripting techniques, using the 'centrality' of visitor's gaze, emphasizing and re-locating it, in relation to the narratives and architectural regime of *Immersiva*. For this purpose, programming and suggesting an 'ideal' trajectory to the visiting avatar is one of Bryn's remarkable techniques. Her artistic standpoint relies basically on the possibilities of allocating her gaze in that of us, the viewers; and by this procedure, taking partial control of a number of 'poetic trajectories' and findings that only the avatar's endurance, curiosity and commitment can discover (or not) on her sites. In the end, what really matters, she claims, is the poetic continuity, the fluid stream

of narrations threading, intersecting or recomposing each other, as one has always experienced in dreams, creative epiphanies and fantastic day-dreaming. Bryn intensively assumes the preservation of a poetic and literary continuity, that is why the visitor needs constantly to *re/locate* herself towards the intermedial entangling of sensorial and affective processes, in which the lyrical and mysterious spirit of Bryn Oh, the oil painter-artist from Toronto, will seek to 'bring your avatar inside the painting,' through harmonious and mathematical compositional patterns. All the while, Bryn Oh, the skillful computer animation artist, strives for your patience, curiosity and constant feedback, in order to put in motion the kind of plots that are best perceived in task-oriented action, like in the film structured immersion of her *machinima* works. Bryn's *mythopoeia*, due to the virtuosity of their formal and painterly treatment, makes avatars recognize themselves as accomplices and integral parts of the artwork.

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- Paul Ricoeur, *Oneself as Another* (Chicago: University of Chicago Press, 1992), 16. What Ricoeur means by this term is "the development of a kind of story line or assignation of roles between a character—a subject—and a narrative in which the order of submission between one and another can oscillate."
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- Adriano D'Aloia, "Adamant Bodies," 56.
- Paul Ricoeur, *Oneself as Another*, 16-17. The term *actant* refers to characters or players capable of affirming themselves through action and narrative. [...] "narratives express (represent) worlds inhabited by agents capable of responding to questions such as 'Who is speaking? Who is acting? Who is recounting about himself or herself? Who is the moral subject of imputation?'"
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- Ibid.*
- Boris Groys, *Art Power* (Cambridge, Mass; London, England: MIT Press, 2008), 84.
- Anna Munster, *Materializing New Media. Embodiment in Information Aesthetics* (Hanover, NH.: Dartmouth College Press, University Press of New England, 2006): 172. "I suggested that virtual reality and computer gaming offer experiences of nonlinear temporalities where time is compressed, layered and multimodal rather than disappearing or monotonously stretched into an eternal present[...] [What I] suggest is unfolding for global information aesthetics, a vector that perhaps signals its most radical shift yet. In all modes of digital media production we are witnessing the move from regimes of spatialization to those of temporalization: media are no longer sent from one location and received in another but diffusively distributed and qualitatively changed by the differentials that guide that distribution. [...] we are in the midst of a shift to aesthetic regimes that rely upon temporalities rather than spatialities while they are being supported by emergent, networked socialities."
- Boris Groys, *Art Power*, 61.
- Ibid*, 62.
- Ibid*, 62.
- Ibid*, 65.
- Ibid*, 91.
- Ibid*, 85.
- My avatar, Lacan Galicia, was able to appreciate SL artwork that shows the degree to which individual subjectivity has been updated to an enhanced version of the "technological hyper-subject [...]" the belief that contemporary subjectivity is connected to and depends on digital networks: the contemporary hyper-subject is made up of human and machinical/technological components, including [...] protocols, processes and the hardware and software platforms regulating the functioning of digital networks. Networking, as a cultural practice based on making networks, is a multiplication of identities, roles and methods no longer built exclusively on human beings but also on non-living beings and relevant topologies and physiologies." Mario Costa, *Dimenticare l'arte. Nuovi orientamenti nella teoria e nella sperimentazione estetica [Forget About Art]* (Milano: Franco Angeli, 2005), quoted in Vito Campanelli, *Web Aesthetics*, 226.
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- Gerardo Toledo, *Because I am Not Here*, Appendix C, 210-218. Bryn Oh interviewed by the author (London, Canada, January 29, 2011).
- Ibid*: "My audiences are those who like to lift up a rock to see what lives under it. People with great curiosity and patience. I hide many elements to my work inside the surface. Both mentally and physically. For example, I may have a tiny word printed on the side of a work. If the viewer types that word in chat then the sculpture will 'hear' it and open up a hidden compartment. When the compartment opens the viewer will then be able to find new layers to contemplate. If that viewer doesn't type the word in the first place then they will never discover other elements."

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DIGGING INTO THE CASSAVA TUBER: ARCHIVING SOCIAL MEMORY IN CYBERSPACE AS SOCIAL DIGITAL ARCHAEOLOGY

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ABSTRACT

This paper suggests a social digital archeological approach in digital archiving of social memory as a wider cultural mapping in database art. Following new media theorist Lev Manovich's analyses of database as a new symbolic form of the computer age, this paper intends to discuss *Operasi Cassava* as one of this kind of cultural form supported by database.¹ Whereupon then it is appropriate for the authors to consider poetic and aesthetic aspects of the archive that is now being collectively built by the participants. Essentially it might be possible for the project to recast the cultural distinctiveness in the midst of the diversity of people and experiences as a positive integrative force in the sustenance of social identity in Malaysia.

INTRODUCTION

In the project, the authors outline a vision of online archive that enables storage and access of social memory in the form of still images, sounds and texts related to the cassava² plant for its rich cultural history. The authors look at the social and cultural significance of cassava and collect stories and memories related to the evolution of the plant through its migratory process, drawing parallels between diasporas and the dispersal of meaning over the internet. The goal of *Operasi Cassava* is twofold: first, to create cultural narratives corresponding to the living condition of a cassava plant. The second part of the project is the archiving of the social memories related to the plant in an online repository. The digital archiving strategy contributing to these goals will be discussed in this paper.

Operasi Cassava is positioned as a participatory project that invites participants to contribute stories or memories related to cassava. The crowdsourcing approach to solicit social memories emphasizes the collaborative acts of individuals. Participants can use the submission form to upload their data to the online museum and assign attributes to associate with their content. Working through this approach, many peculiar stories related to the subject matter have been collected. The resulted online museum is a public repository that archives social memories on cassava, capitalizing on the networked social space. Despite the digital archive being called a 'museum,' the authors argue that database archive is different from institutionalized narrative of history by addressing the paradigm shift of memory institutions from institutionalized memory to information habitat.

THE MEDIATED SOCIAL MEMORY

Operasi Cassava was inspired by the story of survival during the Japanese Occupation in Malaysia (then Malaya) between the periods of 1942 to 1945, narrated by the author's (Lim Kok Yoong) grandmother (Fig. 2).



Fig. 2. Screenshot of online museum's main page that randomly display memory submitted by the participant, simulating a flashback of social memory, CC.

From her reminiscences of the Japanese Occupation, she would mention how she had lived through it by eating cassava when food rationing was introduced for essential items such as rice, sugar and salt by the Japanese army. Different ethnic groups in Malaysian society give different accounts of savoring cassava when comes to their memory of the tuber plant. The various ways to savor cassava in the local delicacies reflect the multi-ethnic makeup of the society. However diverse Malaysia's society³, a common grass roots' narration of Japanese Occupation often revolves around the activities of eating this food. It seems that cassava has assumed a rather grounded and earthy role in the common consciousness of Malaysians' association, perceptions, memories and affinity with it. As De La Mata notes, Vygotsky's notion of semiotic mediation pointed out that the distinctive feature of human memory is its mediated nature. In this context, Malaysians might not remember the event directly, but through the 'intervention of mediational means,' and in this case it is the narrative structure used to remember stories. [1] Using the analogy of cassava migratory history from South America and the migratory history of different Malaysian ethnic groups, *Operasi Cassava* asks how and why diverse people come to think of themselves as members of a group with a shared past. According to French, social memory is a concept used by historians and others to explore the connection between social identity and historical memory. Collective memory is used interchangeably to place emphasis on the internalization of group identity. [2] It is social memory like the memory of eating cassava that becomes mitigation for the heterogeneity in the society and helps weave the nation's historic-social fabric.

The authors also draw on the ongoing digital archiving aspect of *Operasi Cassava* to examine the context of technology in the mediation of social memory. We can begin by looking at the usage of computer (this includes smart devices) by the participants to capture data in multimedia forms, archiving and sharing material in ways that are deeply personal and yet instantly collective through

being linked to a global memory scape of the World Wide Web. [3] This digital take-up, resulting in communicative memory being transformed into cultural memory is not to be treated as personal, temporal or easily erased. Appadurai made an interesting analogy for Internet-based archives to prosthesis of individuals' private existence. In his text, Appadurai advocated archiving as part of some sort of collective project. [4] Specifically in the context of this project, the online museum is prosthesis of co-existence of multiple ethnic groups in Malaysia. From this perspective, memory is considered to be a mediated socially constructed process. The enabler for this possibility is cyberspace, with its increasingly networked structure bringing to the increasing user generated content and database system that provides the storage and retrieval of these digital contents.

DATABASE AS INFORMATION HABITAT

The online Cassava Museum in *Operasi Cassava* is a database designed for storing, retrieving and managing content submitted by the participants. Besides contributing data to the database, the participants also contribute to how the data are remembered with the technologies of remembering, for instance by assigning the metadata that helps the data to be organized thematically or contextually. Cassava Museum leverages the contemporary participatory culture on the internet emerged from Web 2.0 by inviting participants to contribute stories or memories in the form of image, text and sound that are related to cassava. With Web 2.0, we experience something called “user-generated content,” which means that beholders also deliver the content. [5] The resulting online museum is a public repository soliciting contents from the crowd that benefited from the Web 2.0’s democratic promise. The distinctive Web 2.0 features of Cassava Museum employed by *Operasi Cassava* are social tagging and social sharing. Social tagging allows participants to classify and describe their content using their own vocabulary for easy retrieval in the future (remembering). (Fig. 3)

Social sharing allows participants to popularize or share the content via social networking platforms namely Facebook and Twitter. (Fig. 4, 5) Participants can posts content from the online museum to their individual social network timeline.



Fig. 3. Online museum's hashtag display fed by the participants, viewers can filter and access the submissions associated with a particular hashtag from this page.

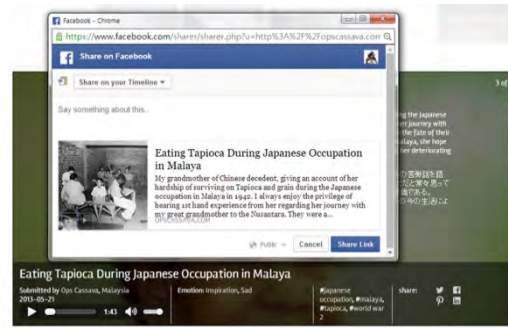


Fig. 4. Social tool - 'share on Facebook' feature embedded in the online museum.

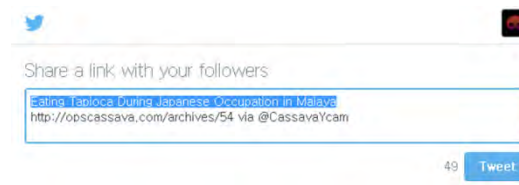


Fig. 5. Social tool - 'share on Twitter' feature embedded in the online museum.

This “bottom-up” type of knowledge capture (compared to hierarchies, which are “top-down”) is the new social memory paradigm emerging out of an interconnected information environment of networked data and user involvement – an information landscape Jannis Kallinikos refers to as the information habitat⁴. On the contrary, memory institutions such as museums call for the formation of a canon consisting of cultural heritage artifacts. Marton describes canonization as the selection order and preservation of cultural artifacts, which are deemed valuable for a social formation – be it a group, collective or society; a faith, nation, artistic tradition or scientific discipline, to name a few. [6] By the same token, Weibel criticizes museums as having mercilessly followed the Darwinian model of selection. Culture has become therefore the embodiment of this selection, the expression of selection. [7] To further distinguish the “bottom-up” oriented database system from the “top-down” institutionalized narratives of memory institution, Manovich says, “As a cultural form, database represents the world as a list of items and it refuses to order this list. In contrast, a narrative creates a cause-and-effect trajectory of seemingly unordered items (events). Therefore, database and narrative are natural enemies.” [8]

SOCIAL DIGITAL ARCHEOLOGY AND DIGITAL ARCHIVING

Social digital archeology is understood as the usage of digital media and digital information to acquire a clearer picture of the society that uses them. [9] In his installation work '*Digital Archeology*',⁵ Bartosik finds the simplest way to define digital archeology as the process of revealing lost and forgotten data. [10] Other definitions of digital archeology usually associate with digital preservation of digital culture or digital representation of archeological information. However obscure the definition of digital archeology remains, the authors put forward digital archeology as a strategy for recollecting the specific types of

media that we rely on to aggregate our understanding of our past: text, sound and still image; digital archiving as an extension of our memory processes thus the information habitat for future retrieval or studies. Hence social digital archeology can be understood as a communal effort to accomplish these tasks. Drawing a connection between archive with memory, Dekker defines an archive as a collection of documents and records such as letters, official papers, photographs, recorded material or computer files that is preserved for historical purposes. As such, an archive is considered a site of the past, a place that contains traces of a collective memory of a nation, a people or a social group. [11] Thus the authors suggest the act of remembering can be understood as a process of recalling or recollection, comparable to excavation in archeology to uncover archeological remains. This process fits in logically with the retrospective nature of digital archeology, which is to find the root from which memory grows.

What relevance might this project have as a wide interest in media art emerges throughout the practice of digital archiving? In general, creating a work in new media can be understood as a construction of an interface to a database. [12] Manovich generalizes the underlying database structure of new media object manifested as larger scale assemblage of different media elements. This is the 'modularity' principle of new media, among the five principles put forward by Manovich in his book *The Language of New Media*. [13] World Wide Web is a classic example that demonstrates the modularity of new media. This project epitomizes the same mechanisms through which varying media elements are archived into a database system and appropriately gives the author's disposition to online museum, the absolutely central role of interface that facilitates the storage (collection) and assemblage (recollection) of a specific social memory. Essentially, it is also this interface that facilitates dispersed participants who come together under the interdependencies of geographical, physical, logistical and cyber network. All in all, *Operasi Cassava* is examining the role of memory and database in creating a new way of experiencing if not making art. In her introduction of a generation of German artists who have taken memory under their wing, Assman comments, "It is almost as if a memory that no longer has any cultural form or social function may have to find its last refuge in art." [14]

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ENDNOTES

1. Operasi Cassava project was initiated by Lim Kok Yoong and Yap Sau Bin in the year 2012 to archive social memories related to cassava. at the Media Art Living Laboratory (MALL), Multimedia University, Malaysia. The online museum can be viewed at www.opscassava.com. This website was created in Yamaguchi Center for Arts and Media [YCAM] together with Lim Kok Yoong and Yap Sau Bin for the food laboratory in the exhibition "MEDIA/ART KITCHEN YAMAGUCHI: Open Call Laboratory - An Exploration into Social Anthropology in Asia."
2. Cassava, *Manihot esculenta*, also called 'Ubi Kayu' in Malaysia, is a woody shrub of the Euphorbiaceae (spurge) family native to South America, is extensively cultivated as an annual crop in tropical and subtropical regions for its edible starchy tuberous root, a major source of carbohydrates.
3. Malaysia has a multi-ethnic and multi-cultural society. The demographics of Malaysia are represented by these multiple ethnic groups: the Malay, Chinese, Indian, Bajau, Kadazan, Iban, the indigenous and others.
4. Jannis Kallinikos calls this emerging socio-economic environment, marked by the ubiquitous presence of the internet, information-based services and software-mediated culture the habitat of information. The navigation through the information habitat is guided by the search results page, which is created, based on algorithmic calculations, for a specific user every time a search query is processed. The term indicates that the growing involvement of information in society, economy and culture is associated with important changes in the ways institutions operate as well as shifts in behavioral, cognitive and communicative habits.
5. For his project titled Digital Archeology, Pawel Bartosik used the open source program Photorec to demonstrate how it is possible to recovered deleted memories in a used SD-card that he bought and he printed the unearthed digital photos on 5 posters.

GEOGRAPHIES WITHOUT BODIES, BODIES WITHOUT LAND: VIDEO ART IN THE ISLAMIC WORLD

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ABSTRACT

The weight of a hundred bodies; the search for a physical presence; and the evidence of a suitable location – these are some of the potent images found in the work of three artists explored in this paper. With location as the overarching theme of the 2014 International Symposium of Electronic Art, this paper understands the complex term in two ways. One is in the more conventional definition as a place out in the world. Another posits the body as a site of contestation – the human physique as the location of societal considerations and politics. The three artists examined provide these differing but related ways of looking at position. Born in different parts of the Islamic world – Iraq, Pakistan and Palestine – their works connect with highly charged issues affecting this region.

Using video as a medium, three artists from the Islamic world offer bodies without a stable location and landscapes that are unpopulated by humans. Jananne Al-Ani (Iraq/Germany), Basir Mahmood (Pakistan) and Larissa Sansour (Palestine) interrogate contemporary geopolitics, particularly ones associated with the Islamic world, in works of video art ranging from hi-tech, science fiction fantasies to more simplistic techniques and narratives. It is important to consider these works under the umbrella of art from the Islamic world, even though it may seem to be a limiting scope. Oftentimes, artists do not want to be labeled as an artist from a particular part of the world or a nation—and the ones discussed in the essay might feel this way. These kinds of parameters were debated in the global art world of the 1980s and 1990s and were claimed to be insufficient, incorrect and sometimes false frameworks. Nonetheless, certain categories might be useful in understanding art today. Viewing works from different parts of the Islamic world together helps in framing an analysis of art that deals with issues plaguing Muslim societies in the 21st century, such as the Orientalist view of the Muslim Middle East. And thus it is necessary to use the term “Islamic world.” The concerns investigated in this paper are ones exploring political dimensions, from the framing of the struggle of Palestinians to the contemporary battles that have been fought in Muslim nations and the difficulty that Muslims face when attempting to migrate internationally.

Larissa Sansour denies the ongoing tension between Israel and Palestine and instead provides a skyscraper as the homeland. No longer are Palestinians vying for a piece of land. Rather, the solution is for them to populate an extremely tall tower – all of them living together at last. Sansour’s futuristic story is a hi-tech response to current politics in which an entire population is denied a piece of earth. The project takes on special meaning now as the conflict between Israel and Palestine only seems to heighten.

Nation Estate is a film that offers a sci-fi vision of the future along the lines of the popular genre in films. However, the exhibition in

which it was presented was called *Science Faction*. Therefore, it denies the fantasy, even as it encourages it. It is a fictional rendering, but based on factual scenarios. From the artist’s statement: With its glossy mixture of computer-generated imagery, live actors and an arabesque electronica soundtrack, the *Nation Estate* film explores a vertical solution to Palestinian statehood. Palestinians have their state in the form of a single skyscraper: the Nation Estate. One colossal high-rise houses the entire Palestinian population – now finally living the high life. [1]

The solution, as offered in the film, is a humorous answer to the struggle that Palestinians have faced in establishing a nation. The violent and traumatic fight finds a simple answer in Sansour’s project; however, rather than it just being an easy solution, the video and accompanying digital prints in fact point to the complexity of the situation. Could one nation actually live in a skyscraper – even an extremely tall one? It is the point of view of the Palestinians who are not offered anything in the way of a compromise. So what is left for them to do but come up with a ridiculous answer? In video and photographs, the artist literally shows that this solution is full of cracks, perhaps like the other ones provided as a way to resolve the difficult situation.

Meanwhile, Janane Al-Ani explores a landscape that has no trace of people. The extensive area seen from above, as in sophisticated military satellite imagery, talks about the missing, referencing the result of war. She has been researching this concept through a series entitled *The Aesthetics of Disappearance: A Land Without People* since 2007. It focuses on the Middle East, the site of multiple wars initiated by the West. The desert landscape is a hotbed of imagined and actual activity in both the contemporary world, as well as more historical settings. It is the site of Orientalist depictions of the exotic East from the past and military actions of more recent years. In order to carry out research, Al-Ani investigated the archives of the Smithsonian Museum for aerial photography from the early twentieth century, developed during the time of World War I. The artist also researched the technology utilized in the *Desert Storm* operations. As the artist explains: The prominent role of digital technology in the 1991 *Desert Storm* campaign was a watershed in the history of warfare and changed the way war was to be seen in the future. Within hours of the Iraqi invasion of Kuwait, the Western media machine had mobilized its forces and set its sights firmly on the region. Through the portrayal of the population, the culture and, crucially, the landscape of the Middle East, it revealed that the nineteenth-century Orientalist stereotype of the Arab and the desert remained firmly embedded in Western consciousness. The site of the war was shown to be a desert, a place with no history and no population – an empty space, a blank canvas. [2]

What is found in the films is a human element – there are remains of human activity both from the past and the present. We see both ancient and contemporary structures. There is flatness in the landscape, as caused when seen from above and although we can see the results of human development, there is no trace of a human body.

On conceptual and formal levels, the films simultaneously draw and prohibit the entrance of the viewers into the mysteries of the Middle East. With the vantage point from above, the landscape is unfamiliar and the artist does not permit the viewer to get to know what is actually there. Perhaps for a moment one can discern the scenery, but as soon as one does, the image changes. Viewers are constantly kept at a distance. This recalls the history of Western interaction with the East. Nineteenth-century painters showed exotic scenes depicting the people of the hot, desert regions in Northern Africa and the Middle East; however, an initial analysis of the images instantly revealed the lack of contact and knowledge about them.

Brought to the contemporary moment, the limited interaction and understanding of actual people continues during the times of Western encounters with the East. Recent military actions utilizing sophisticated cameras allowed for a war executed from a distance. This approach to warfare is controversial, especially given the newer forms of technology like drones (unmanned airplanes that drop bombs on remote sites). In Al-Ani's films, the dominant sound is one of drone. Combined with rapidly shifting images of aerial views zooming in to ground level, an environment of impending doom is created. It is one in which contemporary geopolitics are addressed and questioned.

Basir Mahmood looks into today's global political dynamics as well. He investigates the notion of bodies in search of a land without showing either. Inspired by a recent event in which young Pakistani men died while illegally crossing borders in a container, his video captures a seemingly modest undertaking – moving something from here to there. The immense size of the object (the same dimensions as the container) shifts this simple task into the realm of the impossible. According to the press release for the exhibition at Grey Noise Gallery, Dubai: He recreated the event, working with three basic elements: weight, movement and repetition – weight as ideology, movement as hope to reach a better side and repetition as belief or ritual. The repetition represents the people's stubborn belief in the possibility of change and the efficacy of movement. [3]

In the video, a group of people lifts up the object symbolizing the container and attempt to move it. With tremendous effort and endurance, they struggle to shift its location to its destination – a mere few feet. In this work, as well as in the work of Jananne Al-Ani, we find the absence of bodies, even as it is talking about humans and the human condition. Alternatively, Larissa Sansour presents bodies that struggle to find a piece of land to call their

own. The latter artist also talks of humans and the human condition. The need for a home; the destruction of a society; the desire for a better life – these are the basic requirements and concerns of a people. Through simple issues, these artists address the inadequacies of the larger and more complex system of global geopolitics.

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HUMAN COMPUTER IDEOLOGY

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ABSTRACT

In this paper we propose a theoretical framework of political interpretation of new media art and interaction. All relevant enough cultural phenomena admit a political interpretation and, therefore, carry a political stance. HCI involves an extensive phenomenological corpus that intersects many areas of knowledge, rendering sensible the need of awareness of some of these political stances. There is not and cannot be either methodology or praxis that is not ideologically contaminated.

INTRODUCTION

The core phenomena in any problem of politics, indeed in any problem concerning humanity, are phenomena that have at their center human minds who animate them and who, in turn, are themselves symbolic or cultural processes occurring in the brain; thus, to understand and explain problems of politics one must understand and explain the relevant symbolic and mental processes, which is to understand and explain human actors' forms of consciousness and motivations.

Liah Greenfeld and Eric Malczewski, 2010. [1]

All art is political, Jonson, otherwise it would just be decoration.
Edward De Vere, Earl of Oxford, on the film *Anonymous*, written by John Orloff. [2]

It is easy to agree that all relevant enough cultural phenomena admit a political interpretation and, therefore, carry a political stance. As we have seen, interaction design involves an extensive phenomenological corpus that intersects many areas of knowledge, which renders sensible the need of awareness of some of these political stances. There is not and cannot be neither methodology nor praxis ideologically uncontaminated. The Ricœurian processes of selection (in Ricœur's words "dissimulation"), legitimation and social integration are unavoidable on the social construction of knowledge. [3]

As it happens with all observable phenomena, the background, the context and the knowledge of the observer have a direct impact on what can be observed and on how the observations will be interpreted. From an engineering point of view, some of the conclusions that appear from media analysis do strike as naive. One example is the very late realization of the prevalence and importance of "the digital" on media manipulation, creation and dissemination. In the same vein, Lev Manovich's famous "laws of new media," while reasonable and important in their systematicity, are not much more than a collection of already well – known characteristics of digital media. [4] As well as HCI requires for both its analysis and practice a multidisciplinary approach (embodied by teams or single persons, what Malina once called "New Leonardos") new media art does require a high level of fluency in both the arts and technologies. [5] We propose

that the appropriation of the knowledge behind the involved technologies is the fundamental, defining characteristic of new media art.

In his latest book, *Software takes command*, Manovich anew states the obvious: that software constitutes the central backbone of new media production. In Manovich's words: "There is only software. [...] Software is the central element and theory has not put attention to it. [...] To understand media today we need to understand media software."

There seems to be a distance between media theorists and reality and this late discovery of software as the main actor of "the digital" is surprising. It is hard to tell if this blindness of sorts arises from a misunderstanding of how things are done or if there is an actual lack of theoretical and analytical framework of the "new media." It is not clear if the constructed rhetoric is naive or poor. Media theories need to move over the fascination of the discovery of how media technology is built. Media has to be appropriated *from the rhetoric* and theory needs to catch up with the practitioners in order to establish a meaningful dialogue. The theoretical discourse should not be constructed from a fascinated alien perspective.

THE IDEOLOGY OF THE BLACK BOX

Flusser's black box theory identifies the need for media appropriation in order to decipher new media productions. In Flusser's words: "The coding happens inside this black box and therefore every critic of the technical image has to be based on that, to reveal the inner life. As long as we are not in possess of this critical view, we remain alphabets." [6]

The notion of "ideology" admits several readings, from the Marxism notion of falsehood that hinders scientific knowledge, to the conceptions of Gramsci and Althusser, "who see ideology as an essential part of human existence, [...] a communally shared set of ideas which people draw on to make sense of their existence." Moreover, ideologies become part of material, individual experiences, constituting an individual's worldview, naturalized as ways of "experiencing the world" and operate as actuators of implicit political stances behind design and implementation choices. [7]

There is a need of analysis of the ideological stances taken by new media artists, HCI practitioners, interaction designers and cultural operators in general. Paraphrasing De Vere in the quote that opened this paper, as with any construction of knowledge, all design is political. In designing how we interact with digital devices, the politicality is evident as designers and organizations sample the world choosing the problems to be solved and their solutions.

It is impossible to think about these decisions without realizing that there is always a political model of reality behind them. In Phoebe Sengers' words: "the proposed 'solution' tends to be understood as technologies that monitor users' behavior and either influence them to make a correct choice, where the correct choice is generally determined by the technology's designer." [7] Freidman and Nissenbaum identify three types of *bias* in computer systems, preexisting, technical and emergent; where a *bias* is the slant, the behavioral concretization of philosophical and political stances. [8] We argue that this bias is unavoidable as it is inherent to any human production. The assumption (both explicit and implicit) of the market – that is, the assumption of "the applicability of market models and economic exchange" is one example of ideological models inserted into cultural practice. This conception of "the market as natural fact" also shows how "traditional HCI discourse obscures political and cultural contexts." [9] In the same sense, there is an underlying agreement under the success (academic, social, economic) of any interactive appliance and of every technical artifact. "Ideological analysis reveals that this problem of framing embodies a series of political commitments about who determines what behaviors are acceptable, how users should relate to the authority of technology and what role technology should play in solving societal problems." [9] To perform any serious political or ideological analysis that reflects any reality, the socio-political context and a characterization or identification of the "societal problems" would have to be integrated. Design decisions are not only a product of the ideological models and interests of the designers ("designers" understood in the broadest sense of the word, including organizations, companies and policies) as they include the social, economical and political contexts where the products are designed, offered and inserted. Even if we do not attempt to provide such analysis for any cultural or design artifact, we hope that the acute conscience of how inevitable it is to apply the sieve of ideology will help us to be vigilant of our own assumptions and in identifying at least some of the ideological and political undercurrents in interaction design and new media art.

Each man, finally, participates in a particular conception of the world, has a conscious line of moral conduct and therefore contributes to sustain a conception of the world or to modify it, that is, to bring into being new modes of thought.
Antonio Gramsci, The prison notebooks. [10]

SOME DESIGN ISSUES

Once we have surrendered our senses and nervous systems to the private manipulation of those who would try to benefit by taking a lease on our eyes and ears and nerves, we don't really have any rights left.
Marshal McLuhan. [11]

The close connection between surveillance/monitoring and assistance/augmentation is one of the key characteristics of the high-tech society.
Lev Manovich. [12]

The digital landscape poses great opportunities and challenges in terms of design and therefore in terms of political design, of ideology. Design has a world transforming potential, for it not only shapes the tools we use to interact with the world but it also shapes our ideas and conceptions about the world itself.

Cartography easily exemplifies this. "From the earliest world maps to Google Earth, cartography has been a vital interface to the world." As we cannot perceive the world directly, the world's virtualizations – maps – are the only way we can observe it. Maps guide our perceptions of what the world is and steer our actions in it. We build our mental representation of the world via maps. Indeed, our understanding of the nature of world is created in function of this interface. However, maps are not (and cannot be) an accurate depiction of the world. Instead they are an "abstract and influential creative practice, rich with the power to engineer political views, religious ideas and even the material world itself." [13]



Fig. 1. Mercator projection. Greenland and Africa are shaded. Greenland's size is of 2.166, while Africa's is of 30.22 million km², almost fourteen times bigger. [15]

One easy example of both maps' power and abstraction is given by the Mercator Projection: the world map most commonly used and the one used by Google Maps, among uncountable others. Indeed, the Mercator projection is the projection used in the world map we use on an everyday basis. [14] However, if we look at figure 1, we can see two shaded areas corresponding to Greenland and Africa. These two areas are represented with similar sizes, yet in reality, Africa is almost fourteen times bigger.

Map design shows the power of interaction design as it builds our reality. The world we inhabit is the fictional result of design consumption. Another example of the relationship between design and reality is provided by the "desire paths." This term, coined by French philosopher Gaston Bachelard shows, as we can see in figure 2, the path that emerges in function of the sustained transit of peasants. Desire paths appear due to a systematic use that directly contradicts the design. Design exists in these two examples' apparent contradiction: it is powerful enough as to change our conception of the world. It is weak enough so as to

be blatantly ignored by its users. In the words of NYU's Clay Shirky, design exists in the tension between arrogance and humility. Arrogance to tell users what they should do, humility to understand that users are experts in their reality.

Arrogance without humility is a recipe for high-concept irrelevance; humility without arrogance guarantees unending mediocrity. Figuring out how to be arrogant and humble at once, figuring out when to watch users and when to ignore them for this particular problem, for these users, today, is the problem of the designer.

Clay Shirky. [16]

These two forces behind design are always present and both encode ideological and political stances. We need to be particularly aware of the inevitable ideology of the perceptual interpretation. The appropriation of human perception and the instantiation of affordances will always encode a certain interpretation of the world, a specific ideological model of reality, creating what we could call *perceptual colonialism*.

A few years ago, a YouTube video showing a little girl of approximately one year old trying to perform multi – touch gestures on a printed magazine went “viral.” [17] Even if the conclusions of the video uploader were, in our opinion, plainly wrong, what is interesting resides in the video’s popularity. It provides an example of how used we are to the idea that new interaction designs re-shape our everyday experience and re-define normalcy.



Fig. 2. A desire path in the UK. Photo by Kake Pugh, used under a Creative Commons license.

Efforts such as Google Maps are deeply related to Flusser's suggestion that the apparatus of the camera compels the user to take photographs and in a demented encyclopaedism to attempt exhausting the infinity of all possible images. The omnipresent mediation of digital interfaces to the world poses extremely sensitive and delicate relationships of power, with a profound impact in real life. However, it is the delegation of computational processes to powerful, centralized centers that will produce the biggest impact.

For example, according to a report from Navigant Research, in just over two decades, autonomously driven cars (such as Google Car) will account for 75 percent of all light vehicle sales worldwide. In total, Navigant expects 95.4 million autonomous cars to be sold every year by 2035, totaling more cars than are currently built every year. [18] This will deepen the already existing delegation of navigation decisions to automatic systems, creating new modes of interaction with the reality where users are no longer subjects of the interaction, but, instead, its objects. Besides initiating (and eventually monitoring) the execution of the interaction, users would have no active role in its performance.

This entails a clear negotiation of power. For example, if we delegate our navigational decisions within a city to a company (as we often already do by following navigation software's instructions), we would be surrendering economically valuable decisions. What would happen if Google, for example, wants to negotiate with the fact that it can choose whether people would be passing in front of a shopwindow or not? This type of relationship is not new: we always have had mediated relationship with socially shared spaces. For example, it is more expensive to buy a newsstand next to a bus stop than one situated far from everywhere.

On the other hand, this has potentially positive impact: the creation of more efficient cities, where data is democratized, allowing for new narratives in the relationship with the city and for cities that more efficiently regulate themselves and their resources. Contradictory impulses like this are prevalent in our relation with technology, especially in our relation with commercial technological offers. For example, we want online services to learn about our tastes in order to provide customized experiences while at the same time we want our information to be ours alone.

However, it is worth noticing that these constitute almost always social design problems and not technical ones. For example, there are known solutions that offer anonymity and privacy while at the same time allowing for most (if not all) the advantages of personalized services. Similarly, gentrification processes are well known and documented and have been exploited by economic operators for many years (to the systematic disadvantage of the less powerful who find themselves expelled from the cities).

Historically, capitalistic processes do require regulation in order to protect the less powerful. However, under the difficulties that the regulation and comprehension of mixed (virtual / actual) processes have had, it does seem that a great effort of education would be needed in order for governments to be able to develop or update the normative. Especially taking into account that our relationship with shared social space is already being questioned. However, the inherent flexibility and dynamicity of virtualized practices present both an opportunity and a risk factor.

The very concept of public space is to be contested. Nowadays, in Julian Oliver's words, due to the prevalence of advertising and

billboards, we are facing “a new kind of dictatorship that one cannot escape,” that contests whose public space is. The cognitive-perceptual surfaces have been appropriated by companies and we should reclaim the cognitive space. [19]

However, in crisis lies opportunity. As Rogério De Paula notes, People build “spaces of opportunity” wherever and whenever possible. In his own words: “It is critical to understand and appreciate the ways – often taken for granted and overlooked by the research and design communities – in which people, in particular those from low-income groups, exploit opportunities that the environment (social, physical, technological, etc.) offers for any sort of economic growth or business, often informal.” [20] We cannot help but wonder how will capitalism ensure that the socioeconomic divisions will be maintained? The axis subject-object of an interactive procedure is dynamic and dependent on time and context. Therefore, what will be the capitalist arrangement that makes sure that there still are persons-objects, a *conditio sine qua non* for it?

William Gibson’s famous dictum *Future Has Arrived – It’s Just Not Evenly Distributed Yet* is wrong: the future is evenly distributed: the most common form of Human-Computer Interaction consists on being recorded by a surveillance system. Maldistribution lies in the roles and, sadly, still offers no new insight on well-known and well-established social distribution patterns. Indeed, the relationship with technology is well distributed and in the distribution of roles reside the inequalities. The most common form of HCI is being observed, tagged and recognized by a surveillance system. A passive, objectifying interaction.

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LEARNING FROM THE MÉGAPHONE: DESIGN PRINCIPLES FOR INTERACTIVE PUBLIC SPACE DIGITAL INSTALLATIONS

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ABSTRACT

What happens when a monumental interactive digital “Speakers’ Corner” is made available to city-dwellers as a new form of information and communication technology in real public space? We found out when we saw people from everywhere around the world creatively appropriate *Mégaphone*, an architectural-scale art installation deployed for the very first time from September 4 to November 4, 2013 in Montréal, Canada. For a period of ten consecutive weeks, we conducted an ethnographic field study to observe how local residents and tourists came together to create a new type of digital community, one that forms onsite instead of online. We found that people freely invested the space, gamed the system and subverted the art installation to adopt distinct roles based on their interests, motivations and needs. We also found that participants often used *Mégaphone* to reinforce existing online communities and bootstrap online participation, suggesting that offline locative media has the potential to bring people back into public space and help make the relationship between online and offline technology come full circle. In this paper, we propose four design principles derived from our research results that we believe might better support public interaction in smart cities.

A TWENTY-FIRST CENTURY POLIS

Until recently, the foremost digital infrastructure sustaining what Castells has dubbed the global “informational city” – and others, the “digital city” – was largely instantiated through the Internet: first, as a research network; second, as the post-industrial reorganization of the work force; third, as a global order through which capital, goods, labor, information and services could flow; and fourth, as an expanded cosmopolitan space in which the communal, social and cultural have been appended to all these. [1- 4] At the turn of the twenty-first century, in truly Arendtian fashion, the *polis* was being made and remade onto the World Wide Web as a rich diversity of human activity was slowly displaced onto an online public realm.

At the dawn of the third millennium, it seemed like virtual frontiers were now used to claim and chart new territory. Have these New Worlds served as simulacra of or substitutes for, the real public spaces that had borne the ebb and flow of modern city life since the nineteenth century? As digital practices reshaped the hermeneutics of action by enabling new forms of creative, social and civic interaction online, what role(s) have these real public spaces come to play? Can digital practices produce hybrid spaces? If so, how are these spaces configured? What criteria defines them? What forms of public interaction become possible in such spaces? These are but a few of the pressing questions that arise in the wake of smart cities. Our empirical research suggests that it is the nature of the relationship between interaction

that occurs online and offline that underpins new forms of civic engagement and city living. It is important to remember however that the online and the offline constitute two distinct sites of action that can either mesh in complex ways or not at all. We argue that the “emerging digital hybrid spaces” framework can help explain how virtual spaces of representation and real world places interconnect through digital practices. [5]

EXPANDING THE CONCEPT OF HYBRID SPACE

To explain how mobile computing enfolds digital space into physical space, De Souza e Silva offers a definition of hybrid space as being “a networked space, constituted by a mobile network of people and nomadic technologies that operate in noncontiguous physical spaces [...] the hybrid space is created exactly by the merging of different and discontinuous places within one another.” [6] This definition, however, is problematic, because it only applies to mobile devices that can support a permanent connection to the Internet and can “carry the digital space” around. [7] This implies that De Souza e Silva’s concept of hybrid space can be used to study mobile interfaces such as portables and wearables but not static interfaces such as media façades and situated digital public displays, because her model assumes that hybrid space is the product of connectivity. [8] Furthermore, she argues that, contra to popular belief, this type of hybrid space might actually strengthen relationships because mobile devices have the potential to bring more people together in public space. [9]

Is urban computing analogous to mobile computing? Or can it offer added value? If so, does it have the potential to also draw people together back into the city? Our research suggests that De Souza e Silva’s definition of hybrid space should be expanded to include interactive experiences that do not necessarily require connectivity. Using multi-sited ethnographic methods, we investigated this by taking a close look at how people make and use interactive digital situated displays to see the forms such a model might take.

DIGITAL DISPLAYS AS RELATIONAL PUBLIC INTERFACES

Although design research has been concerned with developing the potential of digital displays as shareable interfaces for as far back as the late 1980s, it is only really at the end of the century that this platform began to be studied, designed and engineered for public settings. [10] It would be difficult to establish exactly what factors initiated this gradual context shift from the personal and private use of screens in homes, offices and labs to their ubiquitous presence and purposes in the public realm of urban space, but research in this area seems to have been market-driven. Coterminously, the Urban Screens movement emerged in Europe and Australia to firmly push back against the commodification of

screen technology in public space. [11] This initiative – now known as the *Connected Cities* global network – advocates the idea that public displays be used for the purposes of place-making, community building and artistic creation. Accordingly, its objective is to encourage people to produce and exchange cultural content through situated public displays within their own city or between cities in order to reclaim public space for social interaction.

Most deployments featured in these contexts, however, require access to connectivity, as do many similar projects intended to “authenticate the public spaces of cities.” [12] Given that interacting through mobile devices tends to support social cocooning rather than group interaction, some designers have been looking at how displays could enable “shared collocated experiences” because, the argument goes, *shareable interfaces* produce other kinds of social experiences than point-to-point interaction. [13] Artists such as Krzysztof Wodiczko and Rafael Lozano-Hemmer anticipated this over fifteen years ago when they started using display technology to explore the “relational” potential of architecture in vast city plazas. [14] Yet design research labs are still just timidly poking at the idea that displays could be public interfaces made to be shareable and sociable, as well as support creative appropriation. [15]

Most public display prototypes are typically designed for interaction through mobile devices or else as intelligent kiosks with touch screens, keyboards or embedded input devices. Exceptions to this include some of the Urban HCI interventions that have supported *Shared Encounters*. [16] Another notable exception is the *Mégaphone*, a dual media façade installation designed to support digitally-augmented collocated onsite public interaction in real time and real space. It uses two large displays to engage people in creative, social and civic interaction, providing them with channels for information sharing, self-expression, discussion and feedback without an online connection.

MÉGAPHONE: A LIVE DIGITAL PUBLIC FORUM

In autumn 2013, Montréal’s *Promenade des artistes* plaza saw over a thousand people from all walks of life taking turns to speak into the *Mégaphone*. This unique interactive artistic installation was produced in response to a call for projects issued in late 2012 by the Quartier des Spectacles Partnership and National Film Board of Canada. Selected as the finalist in this competition, a design team at Moment Factory drew its inspiration from the city’s history of famed orators and popular assemblies, ancient agoras, the traditional soapbox and Hyde Park’s “Speakers’ Corner” to design an urban technology that would transform the downtown area into a digitally-augmented live forum.

A MULTIMODAL SPEAKERS’ CORNER

First iteration of a system publicly deployed in-the-wild during a period of three consecutive months, *Mégaphone* consists of several input/output interfaces: a microphone, eight loudspeaker units, two media façades and four responsive stage lights. Its

most prominent design feature is a monumental media façade that projects the speakers’ words after converting them into French or English written text via a speech recognition software that was custom-built by the Centre de recherche informatique de Montréal.

Mégaphone is designed to function in two distinct modes. Responding to voice input, its live mode and sleep mode coordinate the different output interfaces and define the two main purposes of the installation: it is either a live Speaker’s Corner running in real time/space or else it is a monumental digital palimpsest that archives the concerns voiced by local residents and tourists to display them asynchronously. Live mode is automatically deactivated after 30 seconds of consecutive silence at the microphone; the system then reverts to sleep mode which is the default.

A LIVING WALL

In live mode, this multifaceted art installation is interactive in several ways. First, it amplifies the speaker’s voice throughout the agora space. Second, it is one of the first public display systems to use speech recognition software to analyze the spoken word; The words are first filtered, then separated and finally individually displayed on the two media façades, with changes cycling through as data is processed – in real time on the small façade and with a 30-second delay on the large façade. Third, it projects on the two media façades a gamut of emergent visual graphic designs and colors generated from variations in the pitch and amplitude of the speaker’s voice. Fourth, the large façade shown in figure 1 jazzes up the city with a colorful, dynamic giant graphic user interface (GUI) that displays key theme words to attract urbanites from blocks away. And fifth, it uses a single bright white spotlight aimed at the speaker and three red flood lights casting a warm glow on the audience to digitally augment and spatially define the agora space as an immersive, yet intimate setting.



Fig. 1. *Mégaphone* in live mode, 2013, Moment Factory and Étienne Paquette, art installation, ©2013 Claude Fortin.

A DREAMING WALL

All speech input is analyzed and cumulatively organized into a database according to how frequently or recently a word has been uttered over the course of the deployment. This database is queried in sleep mode in order to display recurring theme words on the large media façade in a grid of red, white and black rectangular boxes. Figure 2 shows that the size of these boxes is proportional to how often a word has been uttered, with bigger boxes containing the words that have recurred most often. Color is also used to visually represent frequency: red for words used most often; white for least often; and black, for those that fall somewhere between those two indexes. In sleep mode, the red ambient lighting floods the installation space evenly in warm mellow tones to divert one's attention towards the large façade, which is programmed to project a visual echo of highlights of the past speeches it dreams of when at rest.

LEARNING FROM THE MÉGAPHONE

Mégaphone was deployed in downtown Montréal during 37 evenings spread out over ten consecutive weeks. Every night, for four hours after dusk, we observed how people invested the space, creatively appropriated the system to meet their own needs and produced live emerging digital hybrid spaces through rich situated interactions offline. We counted over 4,800 participants either as interactants or as passive audience members. Onsite, we conducted short interviews with an average of two participants per night. After the deployment, 21 participants – of which 16 had interacted with the system while 5 had remained passive audience members – granted us one-hour semi-structured interviews. We also interviewed the technical maintenance staff, the producers and the onsite moderator.

To produce design knowledge around the making and the use of *Mégaphone*, we triangulated all this interview data with our onsite field notes and against the scores of video recordings and photographs that had been captured during live interventions. The recurring themes and core insights that emerged from this empirical data informed our analysis, which proposes key design principles to guide the making of similar public space digital installations.

Our results highlight the interactional aspects of the *Mégaphone*. First, we found that designing for creative appropriation had supported different levels of engagement but more importantly, it had allowed people to explore new forms of technology-mediated offline public interaction. However, much to our surprise, we also found that *Mégaphone* was often used by participants to form or bootstrap online communities, suggesting that locative media has the potential to bring people back into public space and help to make the relationship between online and offline technology come full circle in more than one way.

Second, by reflecting on the design process throughout the making of *Mégaphone*, its architectural integration, its deployment and five post mortem meetings, we identified four design principles

that we believe will help support and foster new forms of offline public interaction, but also might provide valuable ideas for smart cities in the future.

NEW FORMS OF DIGITAL ENGAGEMENT

Most people who used the *Mégaphone* told us that they really enjoyed the experience. Indeed, we saw scores of participants come back once to twice a week on a regular basis. Many interviewees reported that even on evenings with a small turnout, they felt the *Mégaphone* fulfilled needs that other digital tools did not. For instance, being able to see and hear people talk about themselves and their opinions in a live context, as well as having a chance to experience just being around real people in public space.



Fig. 2. *Mégaphone* in sleep mode, 2013, Moment Factory and Étienne Paquette, art installation, ©2013 Claude Fortin.

The installation also provided a context for them to meet strangers and to get to know them, which suggests that if the deployment had been longer, we might have seen new kinds of digital communities form around certain themes. The terms *digital community* or *virtual community* typically refer to online digital communication just as De Souza e Silva's definition of hybrid space implies digital practices in connection with the Internet. Our research, however, suggests that digital practices can take the form of technology-mediated communication in urban space without connectivity. As a result, an interactive installation such as *Mégaphone* not only expands the notion of hybrid space, it also calls for a rethinking of terms such as digital community, virtual community and networked community.

But how does the introduction of an interactive urban technology in public space trigger the emergence of new kinds of digital communities? One interviewee said, "With *Mégaphone*, digital technology is not getting in the way of people interacting; it is amplifying the communication process by making the speaker's voice louder and projecting their words onto a screen. It is a tool that slowly breaks down the barriers between people." This suggests that when communication between people is both

enhanced and mediated by digital technology onsite but offline, it can bear enough similarities with online digital practices to be considered in the same category (i.e. digital community), but warrant its own subcategory (i.e. offline).

A LIVE OFFLINE/ONSITE SOCIAL MEDIA PLATFORM

One of our most surprising observations, however, was that many people used *Mégaphone* to engage in dialogues in public space in a way that was much like social media is used online. For instance, people would announce their status and respond in thread-like conversations, bits of which would be displayed on the media façades. Typically, people in the audience would also clap to “like” speakers’ interventions. There were even “lurkers” who would watch hours on end, almost invisible in the shadows at the back of the installation space; they were generally quiet during their first visits, but sooner or later, after weeks of regular attendance, they would timidly try out the microphone on nights when attendance was low. Over time, many showed increased confidence by speaking before bigger crowds.

The installation was also often used by youth as a hangout, while tourists, pedestrians, cyclists and others just waiting for public transport would either briefly stop or else remain in the space for a while to actively listen when the topic was of interest to them. As previously noted, one of the big differences between *Mégaphone*’s live offline social media platform and online social media platforms is that the former confronts participants with strangers that they might otherwise not meet or friend over the Internet.

Our interview data led us to believe that this finding had great significance and implications. As an open forum used to exchange news, views and opinions, online social media platforms – especially the ones that include blogs – have often been compared to echo chambers. [17] In other words, rather than promote creative and rational debate over current issues, they tend to publicize existing content and intensify its impact by endlessly repeating it with little significant change. All of our interviewees said that being in a public space that exposed them to new people and ideas made the *Mégaphone* a special place. Paradoxically, we saw that it could also later reinforce online activity.

OFFLINE AND ONLINE MEET ON DIFFERENT TERMS

One interviewee said, “*Mégaphone*, is a Facebook™ wall but with a stage. I used the installation as a stage in the city to digitally record interventions and words on the façade and then post those images and videos online to connect the online digital world to the real world,” while another said, “The fact that our spoken words are inscribed on the façades and archived in the database gives the speakers’ interventions a material form in public space but it also leaves a visual trace we can then photograph.” Many photographed the words on the media façades or their performance at the Speakers’ Corner platform with their personal digital recording devices to keep them as a souvenir or to republish them online. In fact, this relay between the onsite real time/space experience

disconnected from the online world and its second life in the form of a historical archive circulating on the virtual spaces of the Internet for display on the screens of portable and desktop devices was a digital practice that was so routinely performed by participants that it underscores the potential for “offline” and “online” digitally-enhanced sites of representation to mesh in more motley ways than we typically imagine. Our field observations suggested that designing and studying an offline technology deployed in public space could help better understand ways in which the offline and the online might meet on different terms. For instance, tourists tended to photograph the façades to create “digital postcards” that they would instantly email to friends and family abroad, while local residents tended to repost their recordings on websites, blogs and social media. Most did so to capture Barthean evidence of their having-been-there. [18] Interviewees often stressed the fact that the added digital value of *Mégaphone* was that it was an onsite embodied digital experience: “I wouldn’t want the *Mégaphone* experience to go beyond real time and space. Its physical quality is what makes it special.”

PLIABILITY MEANS EASY TO USE AND EASY TO HACK

The interactive system had several affordances that were easy to use, but could also be hacked for fun. For instance, if a word was repeated over and over, it might appear bigger or else several times, which prompted many users to fill the façade with words like “love” or “happiness” or the name of a dear friend. And although the speech recognition system either ran in French or in English mode, a family from Argentina gamed the system one evening by speaking only in Spanish and then photographing the transcriptions on the large media façade. It seemed like the pliability of the system allowed people to appropriate the *Mégaphone* for a wide variety of purposes and make it theirs. For instance, field observations of *Mégaphone* showed that the digitally-augmented installation was used to make news announcements, offer social commentaries, present alternative views on news events, share personal insights on a social problem, engage in public debates with people sitting in the agora space and even stage several first-person news reports in public space. But mostly, we saw it used for free play and performing public space.

As a result, our hypothesis is that an open and flexible design creates the possibility for an interactive device to become multifunctional and thus enable people not only to interact with, but also through, an urban technology. Our fieldwork also strongly suggested that the installation was popular because it did not get in the way of people interacting with one another and let participants free to choose their level of engagement with the system and with the people in the installation space. For this reason, the issue of programming during the deployment was crucial.

OFFERING DIFFERENT OPTIONS IN THE PROGRAMMING

The public-private partnership that made the production of *Mégaphone* possible set up a website on which people could reserve one-hour long sessions to use the Speakers’ Corner.

Weeks before the launch and during the deployment, different activist groups, performance artists, poets, intellectuals, journalists and students could easily log on and reserve their session online well in advance. This offered everyone a guarantee that they would have their moment in the spotlight. The last hour and empty slots automatically became “open mike” sessions when anyone could just hijack the installation. And this was generally when free play with the *Mégaphone* occurred. After three months, we realized that programming is likely one of the main design challenges. On evenings when there were too many scheduled interventions, people tended to behave more like passive audience members than participants; they would observe the interventions without socially interacting or actively engaging with the system. Conversely, too little curating sometimes left visitors wondering what to do. When it was simply put at the disposal of the general public, the installation seemed intimidating to many. However, if a passerby started to use the installation, often with friends, within fifteen to twenty minutes, other pedestrians would stop and watch. Most would sit down for a while and some would want to take turns trying the installation too; this is when we would observe creative improvisations played to the audience.

HUMANIZING HUMAN-COMPUTER PUBLIC INTERACTION

For this reason, the presence of an onsite moderator proved to be an important factor in attracting people and motivating participation. Although he had initially been given the task of flagging inappropriate content and quickly intervening in cases of aggressive behavior, people tended to well behave. Over the ten weeks of deployment, there was only a single incident that involved one audience member shooing a speaker over a religious issue. Before the onsite moderator had time to say something through his handheld megaphone device, dozens of other audience members turned towards the heckler and stared her down until she stopped, got up and stomped off furiously.

As a result, the onsite moderator who had been hired for three hours every night of the deployment became a master of ceremony whose role was to introduce speakers during programmed interventions and encourage people to try out the system during open mike sessions. By demonstrating the different ways that users could interact with the system, he actually piqued curiosity. As a veteran interviewer, he was both skilled and experienced at making people feel welcome and at ease. And indeed, most people responded to his invitation to use the Speakers' Corner. This suggests that when it comes to public interaction with urban technology, adding a socially intelligent presence to the system may well bring added value to its design.

DESIGN PRINCIPLES FOR INTERACTIVE PUBLIC SPACE DIGITAL INSTALLATIONS

We derived four design principles for public space digital installations from our field observations of *Mégaphone*. We present them in the following section. As Hornecker et al. remarked, design principles are a set of abstractions that function

as high-level concepts “designed to sensitize the designer to different possibilities.” [19] They are therefore not intended to be prescriptive. Instead, they are meant to help designers reflect on possible entry points, affordances and trade-offs in relation to the design of urban technology.

DESIGN WITH COMPONENTS OF CONTRASTING SCALES

Although it was designed as a speakers' corner – essentially a digital soapbox which is typically a small pulpit in a park or on a street corner – most people associated the *Mégaphone* installation with the idea of a Greek agora. People described it as a social space and a space of action: “it made me think of Ancient Greece [...] we gather in a public space and debate together [...] it is civic in its very essence [...] watching interventions on television or online would take away from this lived experience.” Because it was monumental, impressive and intriguing, several interviewees told us that the large media façade had drawn them in, especially when they more than a block away: “you can't 'not notice it' even from afar and right away, you know what themes are being discussed.”

Others said that its architectural scale defined the space: “Because the façade is huge and impressive, it becomes a defining element of the installation. So instead of just listening to someone speak in a microphone – which is not something new – the big media façade makes *Mégaphone* an artistic and architectural object, it makes the intangible aspect of the digital become palpable in public space and it gives people another reason to speak.” From a design perspective, we would purport that, in fact, it was the interplay between all the input/output interfaces that were of different scale orientation and placement that restructured the public space either by creating real physical boundaries or else representational frontiers constructed through content and interactions. The life-size system components dynamically contrasted with the architectural-scale ones to produce an immersive environment that, unlike virtual reality, called for physical interaction with interfaces, urban furniture and real people.

DESIGN TO AMPLIFY AND PUBLICIZE PRESENCE

This notion of scale also speaks to the publicness of the *Mégaphone*. It is this aspect of the system that people made use of in order to self-represent through the spoken and written word. For instance, although the large media façade afforded a 30-second delay before displaying the speakers' words, its most common function was simply as a giant screen interface to self-publish in urban space.

While some people described this as an empowering experience: “I can put the word ‘corruption’ up on that façade!” and “I feel powerful when my voice is amplified throughout the plaza and my words appear big on the façade,” others saw it as a means to make a physical mark “it was a way for me to say I was here” and “while I read my poetry, I could see my words being projected as its own work of art [...] the façade allowed me to transform the space by leaving a material trace.”

Many interviewees used the words “trace” or “mark” to describe how the installation allowed them to inscribe their visible and audible presence in an urban space in which they usually felt anonymous, invisible and transient; one could argue that presence also can restructure public space.

DESIGN WITH A LIGHTING SETUP THAT SUPPORTS GOOD QUALITY DIGITAL RECORDINGS

As we have previously remarked, when we interviewed participants and observed people in the installation space, we noticed that a significant number of people would use their personal digital recording devices to document live interventions as well as words on the large media façade. Because many of our interviewees showed us where they reposted those images and videos online, we were able to follow the life cycle of some interventions from live recording to virtual reproductions on the World Wide Web. It became quite clear that some participants were using the *Mégaphone* as a visual context to stage or produce content that could later serve to bootstrap online initiatives.

Although *Mégaphone*'s responsive stage lighting was originally intended to create immersive effects that would help define the installation space and draw people's visual attention toward the Speakers' Corner during interventions, our field findings strongly suggested that many people also needed the lighting setup to support good quality digital recordings. According to participants these recordings were either used as a memento of their onsite experience, shared with friends by electronic means or else posted online to publicize their presence, the event or an agenda. By extending the representation of a live onsite event onto a digital archive or online webpages, these interaction strategies can also be said to be restructuring public space.

DESIGN FOR INCLUSIVENESS

Fischer proposed a *Cultures of Participation* framework to describe how people have the possibility of engaging in different levels of participation in any given sociotechnical environment. [20] He argues that people will transition from passive consumers of content to more active forms of interaction when a system is designed to help them do this at their own pace and with a sense of control. Certain factors seemed to facilitate this with the *Mégaphone*. First, the system itself supported a wide array of roles ranging from unengaged bystander – to active observer – to content contributor – to collaborator – to hacker that creatively appropriates the installation and thus redefines its possible purposes. Second, the schedule offered both “curated content” in the form of programmed speakers and “open mike sessions” that allowed for improvised free play. We believe that this allowed more people to engage with the system on their own terms: while some people preferred just sitting, watching and listening, others enjoyed being in the limelight or to game the system. Third, the fact that the installation had a simple input interface (i.e. the microphone) that could output content transduced into different modalities (i.e. sound, vision, proprioception) supported multi-

functionality and seemed to multiply the possibilities for creative appropriation. And finally, fourth, as people came back to be part of the installation space over the course of the 37-day deployment, they felt more comfortable with engaging in social interaction and meeting strangers. These regular clients gradually began to invest the site with personal meaning, form local publics and create onsite networks, thereby reconfiguring this public space into a social space.

CONCLUSION

Could *Mégaphone* be construed as a game changer? We believe it can because it provided an unprecedented example of how an interactive public space digital installation could expand the definition of hybrid space by showing new possibilities for onsite/offline public interaction. It also supported online presence by providing a live context for users to produce personalized good quality digital recordings and later repost them online. This study of the *Mégaphone* deployment has aimed to make a contribution to the literature by showing some of the ways that digital public displays could be used with voice recognition software in urban space. It has also proposed four design principles for interactive public space digital installations derived from our field observations.

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LOCATIVE ART, IDENTITY AND MEMORY: PRODUCTION OF PARTICIPATIVE HYPERMEDIA DOCUMENTARIES IN THE SETTLEMENTS OF LANDLESS RURAL WORKERS MOVEMENT IN BRAZIL

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ABSTRACT

Our paper examines how the production of participative hypermedia documentaries with mobile devices can foment subjectivities and generate social movement within the interstitial settlements of the Landless Rural Workers Movement (MST) in the state of Rio Grande Do Sul, Brazil. The research project was initially underwritten by a CNPq/SEC/MINc 2013 grant, with on-going research underwritten by funding from the Proext 2013 and Proext 2014 Competitions "Contributions of Interactive Art in ICT education for teacher training." We draw upon the appropriation of media art and technology to establish links between the creation of subjectivity as emergent identity, the detection of memory as integrative process within social movement and the organization of parallel creative economies as alternative valuation. The theoretical thrust of our work couples Simondon's philosophy of technics with Guattari's activist ecosophy. To activate our theoretical framework in praxis, we situate mobile devices at the intersection of environmental, social and mental ecologies within locative art. We examine the micro-politics of the quotidian and memory as integrative of experience to bring forth singularizing experiences where both sender and receptor become generators of content mediated through a generalized web of connectivity which provides singular local value within global connections.

Our paper examines two projects that deal with mobile digital devices towards the creation of new subjectivities and the generation of social movement within the settlements of the Landless Rural Workers Movement in the state of Rio Grande do Sul, Brazil. The research projects were initially underwritten by a CNPq/SEC/MINc 2013 grant, with on-going research underwritten by funding from the Proext 2013 and Proext 2014 Competitions "Contributions of Interactive Art in ICT education for teacher training." We draw upon the appropriation of mobile digital devices to establish links between the creation of subjectivity as emergent identity, the detection of memory as integrative process within social movement and the organization of parallel creative economies as alternative valuation. The theoretical thrust of our work couples Simondon's communications theory and philosophy of technics with Guattari's activist ecosophy. To activate our theoretical framework in praxis, we situate mobile devices at the intersection of environmental, social and mental ecologies within locative art under the aegis of Guattari's ethico-aesthetic paradigm.

As such, we seek to generate an enabling ecology of practices which reposition the functionalities of digital technologies and the potentials of web-based social media. We examine the micro-politics of the quotidian and memory as integrative of experience

to bring forth singularizing experiences through the production of videos where both sender and receptor become generators of content mediated through a network of connectivity which provides singular local value within global connections. This entails a shift from considering technologies and media as technological entities towards the activation and realization of difference towards the invention of a subjective society which Guattari saw as being "created within the perspective of a new aesthetic-political paradigm." For both, Guattari and Simondon technology defines an active and vital realm of potential not as a means but as constitutive of an enabling ecology which interlinks aesthetic and ethical concerns. [1 - 3]

From a technical standpoint, digital technologies provide popular access to the means of production of professional quality content whereas web-based social media provide unprecedented possibilities for dissemination and distribution of cultural production. In turn, locative media simultaneously bring into play the couple of mobility and fixity by prompting offerings from local services to re-texture the give-and-take of the informational landscape as well as color the experience of occupation. Location can thus no longer be considered a stable center: location becomes a nomadic quality – an ambulating attractor of unsettled intensifications – as it becomes activated by the displacement of the user and by the topological dimensionality of connected movements. As a territorializing technology, the new communication devices and the indefiniteness of location lead us to reconsider the conception of cognitive subjects and their spaces of occupation. The way we currently use wireless devices and their apps has transformed them from mere passive recipients into active agents of production, reception and distribution of information. Locative media activate or provide access to additional channels of sited information on the most diverse aspects of an environment while generating new hybrid bodies which simultaneously inhabit actual and virtual locations. This enhanced informational landscape composed with mobile devices – commonly referred to as a mobile augmented reality – creates communicated territories, both in the sense of being linked as well as being involved in the exchange of information, as hybrid spaces of digital-informational control and mobility but which are not necessarily physically connected.

EDUCATION AND LOCATIVE MEDIA

The conjunction of ICT, *Locative Art and Education* proposed by our project comes at a historically propitious moment for schools in southern Brazil in which the pace of technological progress outstrips those of educational and social spheres. To bridge this

developmental gap, we proposed the project *Contributions of Interactive Art in ICT education for teacher training* selected for funding in the PROEXT 2014 Competition.

Our research and extension education project is based on continuous training and qualification of teachers in the use of ICT in elementary education. Participating teachers and educational technicians were provided with basic ICT training in order to enable them to apply this newly-acquired skill set in their professional practices. Our entire Interactivity, Art and Technology research group (Inter.Artec/CNPq) was of one mind in the belief that technological innovation is not simply a matter of equipping schools with computers: teachers must also be provided with ongoing training so they can work with a variety of digital media and information and communication technologies while focusing on hypertext and hypermedia languages using an interdisciplinary approach.

ICTs are changing the pedagogic methods of social and educational interaction while encouraging change that goes beyond the simple use of technology. Yet, we sought answers to two pressing questions: at what level do methodological changes affect cognitive processes? What mutations are being produced within schools as a result of new digital interfaces? Reflection on these questions raised others. It was also felt that educators faced various challenges as a result of using ICT: How does the use of digital technologies enhance a critical and innovative outlook on teaching and learning while taking into consideration the aesthetics of digital culture? How do these technologies instigate novel cognitive processes of perception and image creation? How can educators go beyond habitual practices with digital interfaces and in particular with mobile devices, seeing that art transgresses the technology of each era? How can teachers stimulate the production of new knowledge by their students through associative interpretations between the various modalities: visual and/or verbal/auditory?

To attain our objectives, we proposed a two-phase methodological structure. We began with weekly study group meetings at the Federal University of Santa Maria (UFSM) with project leaders of the research-creation project to design the teacher training programs and devise questionnaires addressing the relation between Art, Education and Technology. The Interactivity, Art and Technology research-creation group/CNPq started out with a survey of the state-of-the-art in the fields of Digital Arts and Education and ICT. Based on the findings, the research group produced questionnaires which were then made available online through a Moodle environment to assess the scope and relevance of the topics and themes developed by the program for their implementation in public schools. The compiled results served as basis for the second phase: eight workshops on the use of tablets in education were created for teachers and a SIGATEC symposium on Art, Education and Technology was held at the Federal University of Santa Maria (<http://w3.ufsm.br/sigatec/>).

Out of all the mobile devices available, the research group felt that tablets were the way to go. Their versatility and utility of these devices expand the horizons of the classroom through network connectivity and makes the learning experience more real-world; they evoke greater interest by students; they improve aesthetic, perceptual and cognitive development; and they foster closer student/teacher learning interaction. Thus, with tablets provided by the state government to public school teachers, the research group sought to use these devices for educational development within the public school environment and incorporated the aforementioned theoretical considerations into eight workshops: Tablets and Augmented Reality, Tablets and Audio Narratives, Tablets and Visual Narratives, Tablets and Video Production, Tablets and Hypertext, Tablets and Digital Narratives in Video Gaming Environments, Tablets and Support Materials, Tablets and Learning Tools.



Fig. 1. Locative Media Workshop, UFSM. 2014, Photo courtesy of Andreia Machado Oliveira.

LOCATION AS A NOMADIC QUALITY

The proliferation of ubiquitous computing and mobile media have transformed the landscape of public space. The use of mobile devices allows one to speak on the phone in the metro, to send text messages while walking down the street or perform other activities representing “experiences of private life in the midst of the accelerated movement of the everyday in contemporary public spaces.” [4] Individuals in motion can thus communicate and interact through digital media technologies in cyberspace while being minimally aware of the place they occupy in space. Cyberspace does not eliminate the idea of physical space; the two become hybridized the moment that information pertaining to the physical space is made available within virtual contexts and that the virtual space is mapped onto the physical space which is inhabited by material bodies, thus “the public sphere arises from the complex interaction of material and immaterial spaces in hybrid spatialities characterized by dynamic flows.” [5]

Locative media simultaneously bring into play a double function of mobility and fixity whereby the ambulatory user prompts offerings from local services to re-texture the give and take of the informational landscape. “The location becomes the subject of action: the information “emanating” reacts to and from it.” [6] Yet, location can no longer be considered a stable center: location as a nomadic quality becomes an attractor of variable intensifications as it becomes activated by the displacement of the user. The world becomes mediated by information as a territorializing technology which is subsidiary to mass communication and the whims and preferences of the user. Informational flow generated by control and distribution systems as the center ceases to be the model and is replaced by post-mass media formats “which allow the free and extensive production, consumption and circulation of information.” [7] However, all mediation, whether mass media or post-mass media, leads us back to material culture – we inevitably relate to the world through artificial mediators, namely language, institutions or technological devices.

These new forms of communication and the indefiniteness of location lead us to consider the conception of cognitive subjects. The way users currently “consume” wireless devices and their apps has transformed them from mere passive recipients into active agents of information production, reception and distribution. Locative media allow information to be expanded by providing additional channels of sited information on the most diverse aspects of an environment while generating new hybrid bodies which simultaneously inhabit actual and virtual locations. This enhanced informational landscape composed with mobile devices – commonly referred to as a mobile augmented reality – creates communicated territories, both in the sense of being linked as well as being involved in the exchange of information, as hybrid spaces of digital-informational control and physical mobility. Lemos [8] asserts that the hybridization of physical space and cyberspace is what characterizes the era of ubiquitous communication. Post-mass locative media facilitate the appropriation and distribution of information across networks thus allowing for expressive relations to emerge between cyberspace and urban space. In this way, post-mass locative media produce informational territories where the movement of incoming and outgoing information as an open system is constitutive of new corporalities which together produce associated milieus as cognitive subjective entities.

IDENTITY AND MEMORY

The power of mass media to define and sway public opinion constitutes one of the most powerful forces in defining and modulating how the citizenry thinks, perceives and acts socially, politically and culturally in the world. Media are also leading determinants as to how the citizenry will accept the legitimacy of government and submit to governability: in the battle over the hearts and minds of people, the effects of media and mass communication are of paramount importance and require a new understanding which reflects the new social, political and cultural dimensions as well as the new limitations to governability.

Our project with the Landless Rural Workers Movement in the state of Rio Grande Do Sul, Brazil, underwritten by a CNPq/SEC/MINc 2013 grant, seeks to answer the following question: Does the production of an ontological shift to the conceptual underpinnings of the methods of mediatic practice bring about deep and lasting subjective social change? In order to answer this question, our research starts out from the belief that communication is a process that generates change and that communication media are agents of social change. But the way that they do so depends on how they are posited theoretically and empirically. In terms of our project, this entails a shift from the consideration of media as mere technological entities to a re-orientation of their understanding and use towards the determined activation and realization of a subjective *socius* under a new paradigm of micro-political desiring-production. This in itself brings out a number of problems of an ethico-aesthetic nature which we seek to resolve through the creation of social, mental and material ecologies of practices within a series of hypermedia documentary production workshops.

Participative hypermedia documentary has explored alternative pedagogies towards the acquisition of documentary production skills as subjective development but not through the application of research-creation methods as a pedagogical strategy. This innovative methodology pioneered at Hexagram-Concordia Centre for Research-Creation in Media Arts and Technologies (<http://hexagram.concordia.ca>) in Montreal by Lynn Hughes and developed by the SenseLab is at the forefront of participative methodological innovation. The Canadian Federal Government's Social Sciences and Humanities Research Council strategically recognized this research methodology in 2003 as one of its research funding categories towards the development of knowledge and innovation through artistic expression, scholarly investigation and experimentation.

The goals of this project are two-fold. First, the theoretical repositioning of concepts central to communication studies such as media, agency, change, social movement, identity, memory, subjective agency and the subject/object relation along the lines established by process philosophy. Second, to devise and apply a syllabus based on this conceptual realignment and a research-creation methodology to teach hypermedia documentary methods in a series of workshops offered to the residents of the assentamentos of the MST in RS.

From a theoretical standpoint, if we take Lasswell's linear model of communication as constitutive of one half of Osgood and Schramm's model, the assumption is that the circularity of the process exists on the same plane or field: that there is a corresponsive relevance between the outgoing message and the response in terms of terms, scale and duration. [9], [10] If one considers cinema, the linear model of transmission and reception postulates that we have an exhibitor, a film and a spectator all working together as a coherent communicational whole. Yet, it is obvious that the three are working on different levels of

understanding: the character of the message conveyed depends upon the field of coherence under consideration. If we look at Lasswell's linear, mechanical model of communication, the well known 5 W's – *Who? Says What? In Which Channel? To Whom? With What Effect?* – we see that the point is to get the Message from the Communicator to the Audience to create an Effect – so that, often, in the analysis of media there is a disconnect in answering the five Q's as corresponding concordances and determining exactly what message is in play. For example, the response of the spectator to the exhibitor of a film as message is not an analysis of the film but \$12. This would imply that the understanding of what is at stake is different for the two parties in the visual equation of the model: one could say that there is a lack of symmetry or disparity between the terms constituting the relation. On one level we are discussing the spectators' experience of the film in terms of receptivity as a field of understanding and on the other we are discussing the exhibitor's income in terms of finance as a field in itself. Both fields are consistent and coherent within their own expanses of meaning/methods, but they exist and function on totally different levels even though they both "share" the film as message. There are scholars that still say that these two spheres of interest are not to be confounded, but the whole field of film marketing as a practice and as field of knowledge lies precisely in the expression of the progressive understanding of the interactive functional dynamic of the relation between these two fields of activity. The French philosopher Gilbert Simondon (1924-1989) would say that in this case the film exists as a concretized entity, as a shared or associated element in a "milieu" or medium, in which the film performs various functions simultaneously.

The implications of these concepts on communication theory are not lost on Simondon: his theories of information and transmission through the process of transduction are very exciting indeed and are presented in his *Mode of Existence of Technical Objects* (1958) whereas his theory of individual and collective individuation is developed in *L'individuation psychique et collective*. [11] They are beginning to gain traction and acceptance yet there is resistance not only because of the implicit miscegenation of discourses and the concretization of knowledge and methods between disciplines but also because of the implications at an ontological level: according to Simondon's thought, a thing A can be a something else according to the light shed upon it. This is of major significance epistemologically because it contradicts the three Principles or Laws of Thought, namely, the Law of Identity (A is A); the Law of Contradiction (A thing A cannot be both A and not A simultaneously); and the Law of Excluded Middle (A thing A is either A or it is not A).

The work of French philosophers Gilles Deleuze and Félix Guattari develops the conceptual apparatus that expands Simondon's proposal where the subject is considered as an effect of individuation, rather than as a cause. They develop a means of thought that allows one to work with shifty constituent elements that have no fixed essence and manifest multiple identities always

in flux as well as postulate the concretized workings of the interactive functional dynamic of the relation between fields of activity. For Deleuze and Guattari, the relations which constitute the linkages between fields are not static or permanent: they are dynamic beings (not as nouns but as verbs) which create expanses of operational fields they call territories. [12] "The spatial, material and psychological components that constitute or deconstitute a society, group or individual" seen as territories are of key importance to our project because they are the "apparatuses that comprise history as a lived, experiential assemblage of events and circumstances." [13], [14]

Obviously, the direction which informs these questions reflects a deviation from traditional epistemology. Where traditional epistemology seeks to delimit and constrict problems to determine definite answers to questions, our approach complexifies the process of enquiry by shifting the emphasis from the answering to the posing of questions. This inversion of the traditional metaphysical relationship between identity and difference represents an important epistemic turn for our project. The epistemology of difference emphasizes the generation of questions which propels the advance of creativity and the process of discovery. It delves in the realm of change, difference and open-endedness rather than seek satisfaction in static, definitive and unchanging transcendental formulations. Instead of looking for understanding through questions of essentialism and identity, our methodology aims at a functional or practical understanding based on experience. This is a method anchored in radical empiricism – one which does not vie for a total explanation: rather, it seeks its truth value in terms of relative coherence in experience as local operational functionality. But this is not to say that we are comfortable with vagueness, imprecision or ambiguity; we are simply more comfortable with indeterminacy and open-endedness. This shifts the attention of creation from the end product to the process itself, where what is important is not so much the creation of "images" but the process of alteration to the "image of thought:" it seeks to locate movement of thought as change within the pedagogic process as the conditions, the conditioning, of actual experience. And it is within this always-differentiating field that according to Deleuze and Guattari the image of thought "posits itself and its object at the same time as it is created" and which for us represents the creative domain of our project both for the author and the participants of the documentary workshops as "laboratories of thought and experimentation for future forms of subjectivation." [15], [16]

It is within this immanent plane of invention that research/creation plies its methods looking to discover and create novel qualitative combinations of sensation and feeling as "percepts" and "affects" as realizations of subjectivity. Where traditional mass media systematically "place the receptor outside the frame of experience" in order to exploit the process and widen the binary divides between producer/consumer, active/passive, subject/object, our project seeks to use digital media to integrate and involve people

in participative models of media production in order to dissolve these dualities and heighten political subjectivity as a memorial social dynamic. [17], [18] Thus, we seek to generate an enabling ecology of practices which reposition the functionalities of digital technologies and the potentials of web-based social media. This entails a shift from considering technologies and media as mere technological entities towards the activation and realization of difference towards the invention of a society which Guattari saw as being “created within the perspective of a new aesthetic-political paradigm.” [19]

For both, Guattari and Simondon technology defines an active and vital realm of potential not as a means but as enabling ecology which interlinks aesthetic and ethical concerns. [20] From a technical standpoint, digital technologies provide popular access to the means of production of professional quality content whereas web-based social media provide unprecedented possibilities for dissemination and distribution of cultural production. And to harness their full potential, we need to see them as the intersection of social, mental and environmental ecologies expressive of praxis which “will lead to a reframing and a re-composition of the goals of the emancipatory struggles.” [21] If we look at this from a traditional communication model of generator-medium-receiver, for the MST the most important implication of this model is the generation of content which can be used to give heft and flexibility to their mediatic presence, positioning and agenda-setting at a local, regional and global scale. From a new media standpoint, for the people of the assentamentos, the settlements, this enhanced mediatic existence allows for the establishment of dialog and relational networking in virtual communities as well as flesh-and-blood in-the-world communities.

Content will be produced at a grass-roots level and be user-generated through digital technologies which include digital video, blogging, podcasting, forums, review-sites, social networking, social media, mobile phone photography and wikis. Free distribution and dissemination of this User Generated Content (UGC) can be maintained through low-cost social media and “content-based” sharing sites which place no censoring restrictions. However, the ability of assentamentados and the MST to generate documentary production and disseminate it on their own terms means that these digital technologies and communication techniques can be used for a variety of purposes: for historical and archival documentary, as source material for news and current-event documentary, for the maintenance of their ecology of technical practices and the presentation of everyday life, for fostering solidarity and the expansion of social networks, for educational purposes, for personal self-affirmation and for creative/artistic expression. Within the dissemination and distribution process, access to these materials can be modulated according to individual user security needs or protocols set-up by the MST itself without external influence by using conventional peer-to-peer (P2P) or anonymous friend-to-friend (F2F) file-sharing networks or other file transfer systems. Also, depending

on end-user needs, the UGC can be provided in a variety of resolutions and formats and independently accessed.

But what is key here is that the UGC is, as Touraine points out, an expression of the individualism of the Subject – “it represents the individual in his attempt to be a responsible actor” where the result of subjectivation “is the self-representation of an individual or a group as an actor, trying to impose their own ends to their environment.” [22], [23] The Subject “cannot oppose this invasion with universal principles but with the resistance of [their] singular experiences.” [24] The important aspect here is for individual documentarians to create works according to a different pattern; not one based on objectivity with aspirations towards artistic or professional outcome but on their own decidedly subjective singular experience and their interpretation of everyday events. And it is exactly this expression of the singular experience which is to be brought out in the work of documentary production. It is not a question of dictating what is to be produced and how but of examining structures of *habitus* and the dispositions of creative process by establishing a research/creation methodology within the documentary production workshop process.

The theoretical aspect of the research will make free use of a trans-disciplinary approach to produce the conceptual foundations upon which the ethico-aesthetic ecology of practices will be mounted. As such, the theoretical praxis will consist of a direct formulation of the concepts based on the reasoned survey and consideration of the existing literature according to the thematic delimitations of the project and defined in the bibliography. While we develop the theoretical side of the project, we will be simultaneously creating the syllabus for the practical workshops in light of the directions informed by the theoretical research. The syllabus development process entails a three-phased approach: the first will emphasize the attainment of basic technical capabilities by the workshop participants with simple video cameras (e.g consumer grade or cell phone) or computer tablets; the second will focus on the acquisition of documentary production techniques and the development of expressive capabilities; the third will involve the distribution and dissemination of the documentary productions via web-based social media and dedicated web-sites.

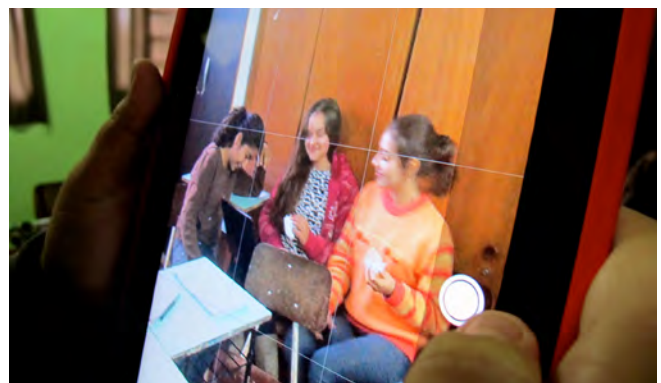


Fig. 2. Experimenting with tablets, 2014. Image courtesy Felix Rebolledo Palazuelos.

The second phase will be the most problematic as the acquisition of documentary production techniques and the development of expressive capabilities will be the crux of our project – it is here that we will be able to see if we can instill an appropriate method of ethico-aesthetic discovery and creation that will convey the singular expression of self and community through the appropriation of media and its direct subjective use. This will entail the acquisition of documentary production techniques and the development of expressive capabilities as ethico-aesthetic discovery and creation that will convey the singular expression of self and of personal histories as narrative constructs through the appropriation of digital media and their direct subjective use. The work carried out by the students in acquiring the technical skills and crafting their narratives will follow the practices of research creation where the systematic, grounded appraisal of the experiential results will be modulated by a rigorous processual and experiential mapping practice as prescribed by a cartographic methodology.

As such, the project is predicated on three phases which come into being and simultaneously co-exist with one another. The first phase is the acquisition of technical skills and the creation of participative videos as experimentation; the second phase will involve the record keeping aspect of the experiences as data gathering; the third phase will consist of the cartographic mapping of experience as interpretation. We emphasize the simultaneity of the various aspects of the research process because in contrast to traditional methodologies which sequentially separate the research protocol into the discrete steps of design, experimentation, data gathering and analysis of results, our cartographic methodology seeks to investigate the movement of thought that occurs in the intervals between these steps. Rather than break down the research process into these discrete protocolary steps towards the eventual discovery of results, the cartographic methodology sees the incremental advancement of the eventual process-as-discovery the result of the research. The principal thrust is not a question of arriving at a Big Conclusion but about the observing and monitoring of the coming to being and deployment of the project's processual unfolding in order to generate propositions. Therefore, the three phases of the project co-exist as mutually dependent participants in an ecology of practices. [25] The narratives of recounted practices seek expression to the witnessed changes but also to the subjective changes which instigate the witnessing of these changes as the creation of novelty as invention as well as the recognition of the advance of novelty as a calling-forth from the future.

ACKNOWLEDGEMENTS

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MAKING ‘GLASS ROAD’ MUQARNA WITH DIGITAL ROAD PROCESS

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ABSTRACT

This paper relates to the ISEA2014, Dubai conference theme of ‘Technology, Science, Art and East-Meets-West.’ Five iterations of a system for sculptural glass installation will be described. This system is inspired by mould-pressed glass and Islamic architecture. These ancient decorative serial production techniques are integrated and enabled by digital manufacturing and electronic art. This revival and reinterpretation of ancient Eastern and Western creative precedents is analogous to the Silk Road, but here, the route is referred to as *The Glass Road*. This substitution problematizes specific creative practices along the road, which in this research lies figuratively between England, Hungary, Dubai, China and the United States.

The creative precedents to this process are digital manufacture and waterjet cutting, electronic art, molten mold-pressed glass and specific elements from Islamic architecture, namely, muqarna, which are ornate stalactite-vaulted ceilings. To make the new muqarnas, molten glass is transformed in digitally manufactured molds into sculptural components. Once assembled, these muqarna, which are still a work in progress, can be used in mixed sculptural and electronic media installations. Here, they are electrically illuminated in an interactive way that is inspired by traditional muqarna as tangible metaphors for celestial light and spiritual communication. This means that transmitted and reflected light is being tested as one potential source of communication in future artworks.

THE GLASS ROAD AND MUQARNA

The Glass Road is a term coined by Sinologist Victor H. Mair to offer an alternative material, one far older and perhaps more consequential than silk, to rename the Silk Road. [1] His renaming refers to the trans-eurasian spread of hot glass working that originated around 3500 BCE in Syria, Egypt and Mesopotamia then moved throughout the ancient world to the Far East. Much later, what is now more popularly known as the ‘Silk Road’ was established between 206 BCE-220 CE.

The significance of Mair’s glass road to this paper, in addition to its material-specific focus on glass art, is that this project also utilizes a methodology of historical problematization, while focusing on art practice contexts. Here, in the fields of glass and electronic art, ancient craft practices are revived and reinterpreted for contemporary sculptural use. This use of the term Glass Road also emphasizes certain ancient creative precedents that flowed from West to East. This West to East examination is aimed at inspiring new ways of making sculpture using electronic art and other material-specific practices such as glass.

The art practical focus of these concerns is the muqarna prototype. Muqarna are also known as mocárabe, stalactite vaulting or

honeycomb ceiling vaulting from Islamic architecture. [2] They are decorative corbels and squinches – architectural support structures for domes that began to proliferate in 1100 CE. While the actual muqarna are not the most developed artworks in the paper, their casual pursuit over many years has driven numerous innovations in my mould pressed glass artworks. Pressed glass and muqarnas are significant here because of their transformation, with the help of electronic art techniques, from two obscure antique processes, to reinterpreted creative assets for conceiving and making sculpture.



Fig. 1. Muqarnas at the Masjid-i-Shah mosque at Isfahan, Iran, 17th century. Hiroki Ogawa. <http://hirokiogawa.client.jp/Travel.html>

Evidence of these benefits is offered by practical examples from my 2011-2012 Fulbright fellowship to China. During the 16-months of my Fulbright, I was based out of Tsinghua University, Beijing. This was simultaneous to my first year as a researcher in glass, at a distance, at The National Glass Centre (NGC), University of Sunderland, UK.

The objective of this paper is to describe innovations that have arisen surrounding the gradual development of a system for sculptural installation that is based on pressing and forming molten glass into components for building muqarna structures. This is supported by the following aims; to creatively revive and reinterpret ancient decorative serial production techniques; to use digital and electronic art techniques to design, manufacture, exhibit and disseminate the new system; and to demonstrate the benefits of interdisciplinary making amongst eastern and western, glass and electronic art contexts.

To support these aims and objectives, the creative and practical processes behind the following four iterations of the system will be described: A *Jaali* perforated screen made by manual mold-

making; a first muqarna attempt made from a CAD/CAM waterjet cut mold; reproducing ancient chinese bi disks with pressed rather than carved holes; a second muqarna attempt with pressed-in holes; and a way of making molds entirely out of glass rather than metal. The paper concludes by suggesting further practical uses for glass that could be of interest to electronic arts practitioners and by discussing how Glass and Digital Road Muqarna addressed the preceding aims and objectives.

PRECURSOR TO MUQARNA: JAALI ITERATIONS

Perforated Screen: Jaali

In 2008, at Alfred University I made a glass architectural screen inspired by both pressed glass process and Indo-Islamic architecture; this was a perforated screen, called *Jaali*. While I had made architectural pressed glass screens before at my glass studio Hurstin Studio Glass and Metal, this one was different. Here, the mold I had made contained notches and flanges for joinery elements. It also was more suitable for forming the molten glass.

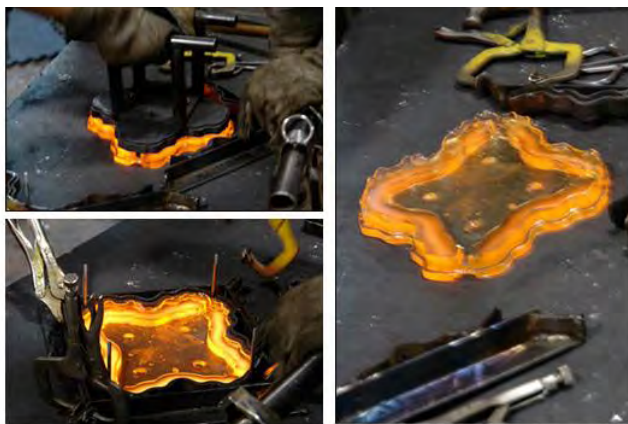


Fig. 2. Sequence of mold pressing glass into tiles for Jaali screen, © 2008, Hursty. The pressed glass tile on the right is still hot enough to be shaped after mold removal.

These pressed-in elements allowed the *Jaali* patterns to fit together and to fit on a metal framework. The design permitted me to solve technical issues by adapting their shapes for easier exhibition and mold pressing. My aesthetic options also increased from making impenetrable wall-like surfaces to perforated ones like the *Jaali*. The mold's creation was entirely manual despite its complexity. No computers were used to design the glass tiles or make the graphite and metal molds or supporting structural framework. While pressing these flat shapes out of molten glass I realized that, once released from the mold, they stayed hot enough, for long enough, to be bent or folded into different shapes. While I did not exploit this potential for making the *Jaali* screen, I would use it four years later for the first iteration of pressing glass muqarnas.

Reinterpreting the Jaali

My artistic concept for the *Jaali* installation was to reinterpret the perforated screen as a metaphor for a type of permeable membrane. [3] To support the reading of organisms permeating

a cell, the structure was placed, as many *jaali* screens are, at the entrance of the space. The experience was that upon entering the gallery, the visitor or -organism, would see a partially obscured view of the gallery through the glass membrane. To enter they would have to take a left or right through cruciform-fringed portals. While the flat screen was meant to provide filtered views of the gallery, an unexpected result occurred. Because the screen was folded in four directions around the doorway (Fig. 3) viewed from its sides, the screen also obscured itself (Fig. 4). This visual layering provided me with a first glimpse of how glass muqarna structures might be made. I had become acquainted with muqarnas while researching *jaali* and found them to be compelling structures. Formally, I was struck by how they sculpted the space around them in a way that upset what was positive and what was negative space. [4] The spatial disorientation of these seemingly unfathomable structures seemed to be inversely proportional to their ability to draw a viewer's gaze over every peak and into every crevice all at once.

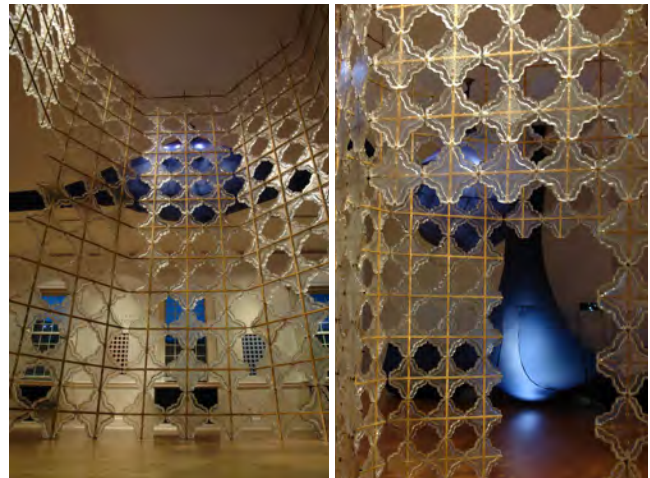


Fig. 3. left, *Jaali*, 2008, Hursty, 5 pressed glass panels folded four ways.

Fig. 4. right, *Jaali*, detail, 2008, Hursty overlapping panels inspired work with muqarna.

I have since realized both practical and conceptual benefits for combining pressed glass and muqarna in two areas. The first is by reinterpreting the spatial lessons of the muqarna as metaphors for sculpting positive and negative form. The second is by using positive and negative ambiguity as a practical concept to expand the role of what a mold can be; which could include becoming an integral part of the finished artwork. [5] The final works discussed in this paper, the *Puzzle Boxes*, are an example of treating molds this way. The *Puzzle Boxes* are essentially molds made out of sheets of fusing glass that melt with the poured glass to become one object. They can be found in the "Areas for future research" section.

COMMENCING RESEARCH ON MUQARNA

As a researcher in creative pressed glass at the National Glass Centre (NGC), I began to formally develop my ideas of mold pressing glass muqarna. This research commenced in 2011

alongside a sixteen month Fulbright fellowship to China. After my experience making the *Jaali* screen four years earlier, I wanted to exploit the post-pressed, hot glass malleability that had intrigued me to make more complex shapes. I chose to tackle muqarna after I was reminded of their ornate structure while visiting Chinese Buddhist temples. There, I witnessed a similar, spiritual and geometrical fixation with roof and ceiling architecture that was concurrent with how muqarnas were being used in Islamic architecture.



Fig. 4. Jinci temple, Shanxi province, built 1023-1032 CE, Song Dynasty corbels and post and lintel roof structure. Image, Hursty.

When viewed as assembled, completed structures, muqarna are formidable to duplicate. My approach, in attempting to fathom how they could be reinterpreted in glass, was to scrutinize each component. After doing so, the prospect of making them with mould-pressing still seemed possible. I was encouraged due to my previous experience pressing glass, in particular, creating the *Jaali* screen. One as yet unrealized result of that project was the benefit of secondary forming of the hot glass into folded shapes. Because muqarna are always concave shapes it became obvious that I should try to take advantage of folding hot glass to make them.

Practically this meant developing a new glass technique. Pressed glass has not been used for sculpting glass art in this way. Reasons for its artistic disuse lie in the Industrial Revolution. It was then that pressed glass was automated for mass production of commercial and decorative glass. Such industrial emphasis used expensive and elaborate molds and presses with little creative input from the workers pressing. [6] As a result, pressed glass eventually became sequestered in factories. I witnessed this creative commercial conflict from my own early experience working on a factory pressed glass team. [7] There I witnessed firsthand how, due to industrial practice, the potential artistic benefits of pressing eluded sculptural uses in the hands of artists. Interestingly, this type of creative disuse also had parallels in muqarna architecture. Oleg Grabar, in his book about the Alhambra palace, attributed a lack of evolved muqarna forms, amongst other features in the palace, to an “insecurity of power and lengthy building programmes” and equated them to “a formal dead end.” [8], [9]

“Muslim artisans were to develop in a truly sophisticated manner the architectonic possibilities of the muqarna and also its potential as a cheap replacement for complicated ceiling masonries. The latter aspect is at times present in the Alhambra, but the more interesting and historically significant side to its muqarna is that even though complex and sophisticated in its versatility, it is almost never innovative.” (Grabar, 181).

Taking into consideration the creative pitfalls in antique pressed glass and muqarna practice. It is especially challenging to reinterpret both in a way that revives, sustains and *Innovates* both in a contemporary art context. This prospect was made even more likely after implementing them with digital manufacturing and electronic art techniques.



Fig. 5. Paper and wax maquettes showing muqarna structure, 2011, Hursty.

Prototyping muqarna: First models and CAD/CAM mold attempt

Tsinghua University in Beijing lacked molten glass facilities, so my early muqarna forms consisted of making folded paper and wax maquettes. Using paper and wax was a simple way to get the shape right before testing with hot glass. It was also necessary to make a steel mold to press the hot glass into. The ideal shape for the final press molds was based on these early maquettes made at Tsinghua. [10]

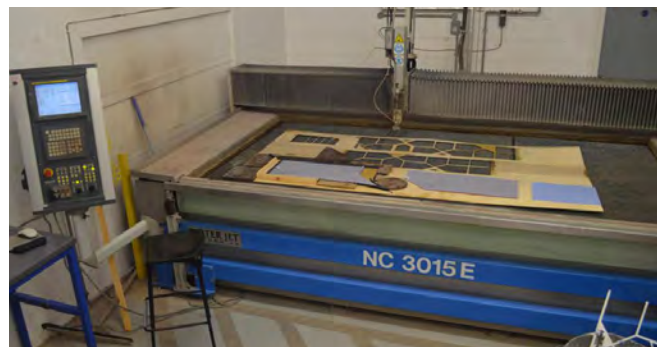


Fig. 6. Waterjet machine at National Glass Centre, University of Sunderland, Waterjet Sweden.

It was while making these final steel molds at the National Glass Centre that I was first exposed to computer assisted drafting, CAD and waterjet cutting. At the time, with no CAD experience, I produced a schematic drawing on paper. My thesis advisor,

Jeffrey Sarmiento, effortlessly entered its geometry into Lantek, the waterjet machine's CAD software, then cut it. This digital manufacture permitted my muqarna designs to rapidly enter the hot-glass-testing phase within one day. This sat in stark contrast to the *Jaali* mold, which had been painstakingly made by hand over the course of a month.

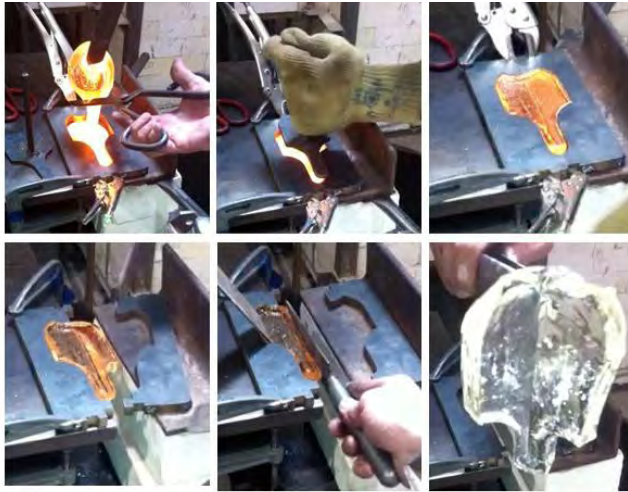


Fig. 7. Muqarna mold sequence, © Hursty, 2012. First attempt at pressing glass muqarna, then folding it in a waterjet cut mold.

Despite quick implementation and demonstrating proof of concept, the initial muqarna design was not successful. Though the hot glass folded well, these first muqarna were problematic as modular components because they lacked joining nodes or holes to affix them to each other or to a framework. It was only after learning the lessons from subsequent projects that the muqarna project would progress.

Chinese Celestial disks: Problematizing bi for joinery purposes

The challenge of pressing in holes while the glass was hot was overcome after experimentation with making glass versions of ancient Chinese jade 'bi' disks. Historically, when jade was scarce, these disks were pressed out of hot glass, with their center holes being carved out by hand after the glass had cooled. I reinterpreted these ancient pressed glass objects for contemporary pressing by problematizing them. I required that the bi holes be hot pressed, rather than carved, by a mold that could have been made with Han Dynasty technology (206 BCE-220 CE). That being said, though my mold could have been laboriously carved using ancient methods, I used CAD and waterjet. Despite that, the ancient technology crux of the problematized design was intact – this bi mold had a removable post/central hole former. Glass would be poured around the post to make a hole.

This way of forming holes and bi disks at the same time worked. The significance of pressing holes in while hot was that the location of holes could be planned in a way that avoided extensive drilling or carving afterwards. With this technique at hand, further

experimentation on other objects could be pursued. One design that benefitted from this improvement was the muqarna.



Fig. 8. Reinterpreting the making of ancient Chinese bi disks, © 2013, Hursty. Top left, CAD drafting, Middle left, waterjet cut graphite mold, bottom left, finished glass bi with press formed hole. Right column shows bi pressed from molten glass.

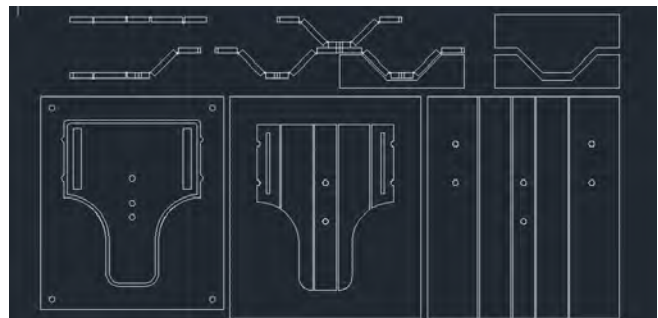


Fig. 9. Muqarna press mould CAD drawing, © 2014, Hursty. This design featured a broader spade-like design that allows for compression into an angled base mold.

Muqarna: Second mold attempt designed with joining features

The next mold took advantage of lessons learned after the first muqarna mold and from pressing holes into the bi disks. This time a broader spade-shaped design would be attempted while a bent 3D metal form would ensure that the angles were folded uniformly. Also, six different hole formers would be used to hot-press multiple holes all at once during the same operation. The mold was comfortable to use, worked well and was used to produce twenty muqarna components in under an hour. The factors that worked well were: its flat profile was easy to pour glass into and quickly remove the glass from afterwards, in preparation for the next pour; the six holes were deep enough and registered correctly; and despite human error, even mispressed glass was still hot enough to re-maneuver and re-press several times until it was pressed correctly. What lacked consistency were the edges of the muqarna.

Though they were hot enough to form properly, sometimes they melted too much resulting in distorted shapes. Despite the distorted edges, the properly registered holes still allowed even warped muqarna to fit together well. These first viable pressings were then fit together and used to form an array of muqarnas that would be used to test with electronic art components.

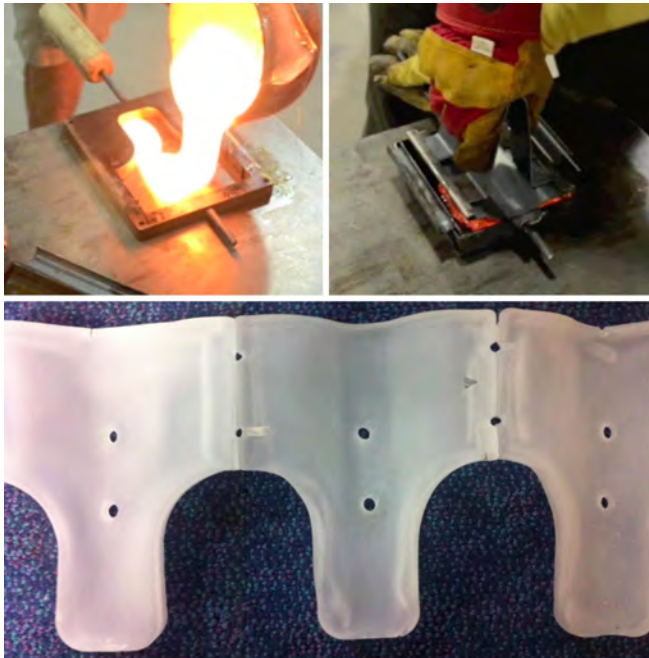


Fig. 10. Mold pressed muqarna, second attempt. © 2014, Hursty. Top left and right, mould pressing the molten glass. Bottom, adjoining glass muqarna with properly aligned glass fastening and registration holes.

Muqarna: interactive illumination

These first twenty muqarna were pressed quickly and aligned well. At this stage they were brought to Attaya projects in Newcastle, UK, where I worked with Lalya Gaye to test their suitability for sound reactive lighting. [11] This was achieved using two software programs and four pieces of hardware. First, an LED strip was placed underneath the muqarna. These were connected to an ENTEC DMX USB interface, a 12volt DC power supply and an LED dimmer. These were controlled using Modul8 and MadMapper software. These worked in concert by providing the LEDs data that was created in Modul8, assigned by MadMapper, transmitted through the ENNTEC and the dimmer and powered by the power supply.

LED CONTROL SPECIFICS

Controlling the lights occurred in stages. First, they were toggled in real time using a white square displayed in Modul8. There, the colors change depending on the position of the square. To make the lights react to sound, the white square interface was shared between the two programs as live video through the Syphon protocol in the MadMapper software. Once in MadMapper, we created a 'fixture' that assigns data, in this case, sound, to LEDs

using DMX hardware. Gaye made the MadMapper fixture assign the Modul8 video feed to a specific DMX channel. From there, the DMX gears sent the data to the hardware, an ENNTEC interface that was connected to an LED dimmer. There the dimmer was assigned the same channel as the original fixture created in Modul8. The result was that the lights dimmed and brightened in relation to the sound received by the computer's microphone.



Fig. 11. A dry stacked, unfastened muqarna array with LED lighting, 2014, Hursty.

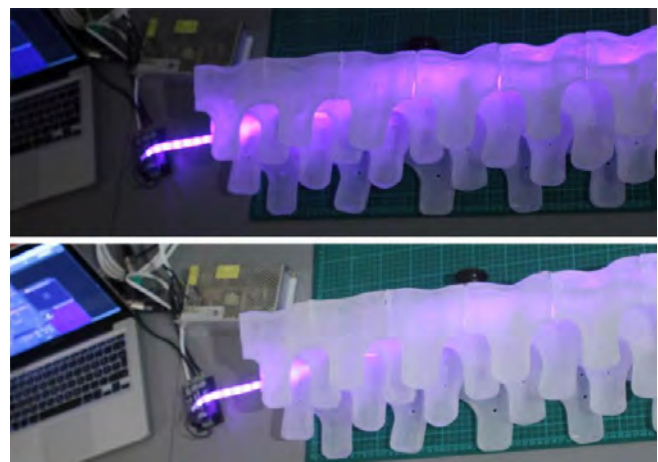


Fig. 12. Prototyping a muqarna array at Attaya Projects with sound reactive LED strip controlled by Modul8 and MadMapper software, 2014, Hursty.

The sound reactive muqarna were a promising introduction to integrating digital techniques in the conceptual phase. This could extend the range of glass and electronic art collaboration in terms of content generation, rather than simply a design and manufacturing relationship.

MUQARNA: FUTURE ITERATIONS AND GLASS MOLDS/ PUZZLE BOXES

Other promising avenues for glass muqarnas have been tried as well. Most recently, at the Shanghai Museum of Glass, I have exhibited groupings of 48 *Puzzle Boxes*. [12] The *Puzzle Boxes* are the result of the sculpting of interior and exterior space that was suggested earlier in the *Reinterpreting Jaali* section. The boxes are actually sheet glass press molds that when poured into, fuse with the molten glass as one object. Eventually they will be used as tessellated wall sections leading up to glass muqarna domed ceilings. Evidence of the muqarna inspiration can also be directly found in the box' structural ribs.



Fig. 13. Puzzle Box mold formers, 2014, Hursty. waterjet cut fusing glass, enamel transfer decals. These glass boxes are really molds and are meant to fuse with the glass poured into them.

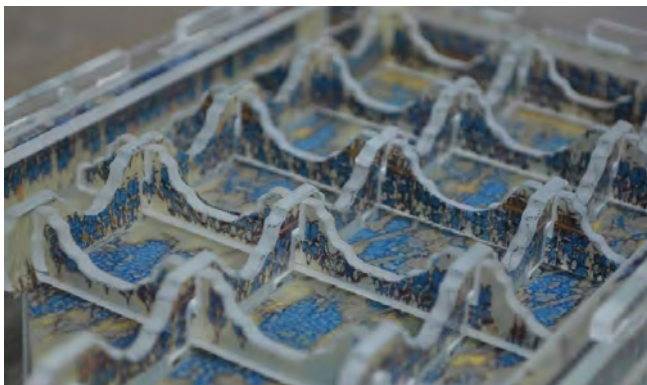


Fig. 14. Puzzle Boxes, 2014, Hursty, screen printed glass molds. This inverted view of the mold reveals interlocked muqarna ribbing that holds the mold together. The screenprinting on the ribs are of formations of soldiers from the Eight Banners 'Blue' army of the Qing Dynasty.

AREAS FOR FURTHER RESEARCH

This paper's objective was to describe the creative process behind the pursuit of a sculptural glass installation system inspired by muqarna. It showed how reinterpreting ancient creative techniques could enhance current creative practice. This aim was strengthened in interdisciplinary fashion by integrating digital

manufacture, pressed glass and electronic art techniques. The reinterpreted techniques were *Jaali* perforated screens, Muqarna vaulting, Chinese bi disks and mould-pressed glass. Their reinterpretation was aided by digital practice, including waterjet cutting and electronic art.

This paper has highlighted glass' unique hot forming potential. However, of potential interest to electronic arts practitioners and something that has not yet been emphasized is a reminder that glass is an electrically inert, versatile structural material for making fasteners and mold elements. The glass component based *Puzzle Boxes* are an example of this. Once joined and assembled, glass fasteners and mould elements can be heated and fused together. The implication of making things this way is that objects, utilitarian as well as artistic, can be made modularly from component parts of a homogeneous glass material, then melted until the components coalesce into one form. While homogeneous, the constituent parts retain the tangible memory of their original function in the form of discrete zones of color. Chemically, these zones could be made from electrically reactive rare earth elements or metallic foils, so that in addition to providing color, these zones could be seen as circuits and respond in specific ways to being used electrically.

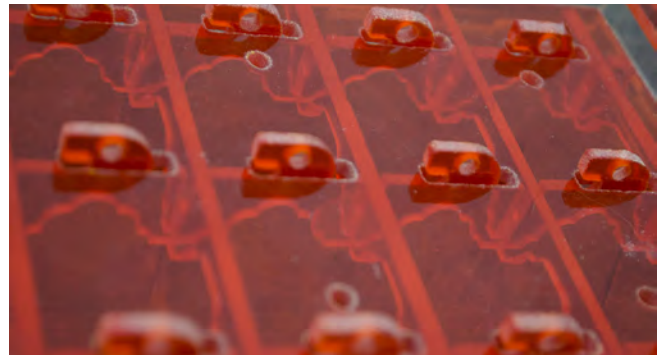


Fig. 15. Puzzle Box mold former, detail from plunger with interlocked muqarna ribbing visible underneath. 2014, Hursty, waterjet cut fusing glass.

CONCLUSION

The advantage of mining and reinterpreting pressed glass and muqarna are that precedents from ancient analog making can benefit current electronic art methods. They provide ready-made adaptable infrastructures that can ensure that rapid manufacture and electronic art retain invaluable hand and material feedback. These are not merely manual techniques with nostalgic appeal in an era of rapid manufacture. With reference to the hand and fingers, they are the *original* "digital technology," and serve as potentially prolific, invaluable sources of innovation for applying rapid manufacture and electronic art techniques to the making and conceiving of material-specific artworks.

This work is being produced through my PhD research in digital manufacturing of press-moulded glass at the International Institute for Research in Glass at the National Glass Centre, University of

Sunderland, UK. It was also undertaken and continues after a 2011-12 Fulbright China grant in Beijing, China at The Craft Department of the School of Art and Design at Tsinghua University. Through studio collaborations, workshops and lectures, the study also took place at other schools: in Hungary at ELTE University, Budapest; in Canada at Sheridan College, Toronto; and in China at Guangzhou Polytechnic, Suzhou Polytechnic, Hong Kong Baptist University, Xincheng MakerSpace in Shanghai and several private glass companies in China.

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ENDNOTES

1. Mair, 2012. p. 3. "Yet, even during this period, many other goods and products were traded by stages along the so-called Silk Roads: Glass, Beads, silver, gold, medicines, spices, wool, furs and so forth."
2. Other names include mocárabe, Arabic: al-halimat al-'uliya which means an "overhang." In architectural terms muqarna structures are called corbels, which are cantilevered supports at the top of a column or wall and squinches, which are the series of overlapping structures that support domes.
3. Arts and the Islamic World, p. 28. This profile of artist Karl Schlamminger has an interesting quote related to his interpretation of perforated screens and Islam. "The screen thus serves as a sort of membrane between the outside and the inside[...] It reminds me of the Hadith which says that man and all creation would be annihilated by direct exposure to the Divine Light; and so God in His mercy veils it with the 70,000 veils of creation."

4. Some interpretations of Islamic art and architecture relate its ornamentation to Horror Vacui or fear of empty spaces. Other interpretations characterize intense decoration as an acknowledgement of the infinite power of God.
5. This concept, exhibiting casting molds and process as art objects themselves is not new. It has famously, been addressed by: Duchamp's *Wedge of Chastity*, 1963, a vulvic cast attached to its mold; Nauman's *A Cast of Space Under My Chair* 1965-1968 and Whiteread's oeuvre of casting interior spaces as solid form. But here it has been updated to include two obscure ancient decorative arts processes; molten pressed glass, a material specific casting medium, with its transparency and semi-to- full automation during the Industrial Revolution adding to conceptual discourse; and muqarna, also an ancient and intensive mold process with its spiritual and architectural origins.
6. After Zembala, 1984. Pressed glass workers were considered unskilled labor. This, despite their intimate and, as some would argue, creative, knowledge of how the mould pressed glass behaved.
7. From Hursty, 2014. Pairpoint Crystal in Sagamore, Massachusetts, USA, is a namesake factory that ties, through the Mt. Washington Glass company and the original Pairpoint factory's press equipment, to Deming Jarves, a glass factory owner and designer who received the first pressed glass patent in 1824 and is best known as an inventor and later an author, who espoused the use of semi-automated pressed glass equipment. As of Autumn 2014, Pairpoint still presses glass using the antique presses.
8. Grabar, 182.
9. Grabar, 160. "Many monuments, especially palaces, were built rapidly, either because the insecurity of power made lengthy building programmes unlikely to reach a conclusion or because they tended to be personal rather than dynastic and were not meant to survive their original patron."
10. While developing pressed glass, this research innovated techniques for using hot wax as a proxy for hot glass. Forming molten wax has similar material constraints as hot glass. Both have a time limit before they cool and harden. Additionally, molten wax is too hot to touch so, like glass, must be carefully handled and worked with tools. These methodological factors promote using wax, which is also inexpensive, as a proxy for hot glass. By doing so, the logistics of mold pressing a particular object -its apparatus, procedures and timing, can be deduced.
11. www.attayaprojects.com
12. The Shanghai Museum of Glass exhibition is entitled, *Now/Then, Influences of Qing Dynasty Glass on Contemporary Glass Art*. It runs from November 8, 2014-August 31, 2015. It is curated by Shelly Xue, PhD, from The Shanghai Institute of Visual Arts, at Fudan University, Shanghai. <http://en.shmog.org/cp/html/?118.html>

NOWHERE, ANYWHERE, EVERYWHERE: LOCATION AS FICTION AND FUNCTION

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ABSTRACT

This paper frames the idea of “location” as a social construction and uses the concepts of nowhere, anywhere and everywhere to throw into relief the mediated ideologies that come to us through various institutions, such as museums and the media. The artists I focus on expose these ideologies through their use of fictional, narrative interventions into locations and conflate them with notions of place.

I propose that ‘the real’ itself is a social construction which is made actual through *mots d’ordre* (order words) as defined by Gilles Deleuze and Felix Guattari. These words serve to create realities, declaring a change of state and are most frequently used by ‘the state.’ This paper forms a shifting image of location citing examples from the worlds of art, religion and the military-industrial complex. It further shows that location is always a more complex notion when interrogated. The artists cited here present location as something of a dream, a nightmare, a memory or a joke. Ultimately, my interest in location relates to my own artistic practice and I find this topic and these artists critical to understanding contemporary art practice and its social and ethical complexity as it relates to power.

NOWHERE: WHERE IS THE CLOUD, LOOKING FOR THE SOUL, BI-LOCATION, FROM LOCATION TO PLACE, CAMOUFLAGE, TERRITORY

I am a location where many dialogues meet, conflate and mutate. I am a point of aggregation, many points of aggregation. I am a semi-autonomous collection of ideas, desires, wills, frameworks, cells, blood, nerves, guts. I am perambulatory. I relocate as my situation requires. Like an atom, I avoid collision. While I am attracted to and resonate with certain frequencies and energies, I also repel and emit them in equal measure. You are the same. You are a location where this is happening, passing through time as a flickering duration of matters.

Jumping around in time – in research – we find an essay that has been stored electronically in a database. Those servers are somewhere and yet diffuse, made of star-stuff, like us. It is the cloud, the puffy and ever-shifting mist of data, that now holds all of your personal information. And how is it that many of us have been tricked into this complete resignation of our personal information, our identities that are located in our persons? From whence cometh the invisible hand that has guided us to this point of giving in? Have we been obliterated through diffusion and turned into a mist, a not-so-anonymous data set? At this moment, can your location be pinpointed through your cell phone, triangulated via cell towers? Can we say that the physical has been transcended? Could it be that the only thing we have control over is the strength of our passwords? Do we want to be located?

Do we want to be a mist? Where are we, really? And to quote Neil Young, “everybody knows this is nowhere.”

Humans have still not been able to locate the human soul, though not for a lack of trying, scientifically even. [1] Perhaps the soul *is* consciousness and one can meditate into the soul and poke around. In any case, this absence of a specific location (in contrast to, say, where the heart is located in the human body) seems likely to persist. And even if we do locate this ultimate location, after we exclaim, “there it is!” we will still be asking ourselves, after a relatively short interval of time, these two questions: what next? And, where to now?

Stemming from the Catholic dogma of transubstantiation (where Christ’s body is simultaneously in Heaven and yet present in the Holy Eucharist ceremony), the Catholic Church recognizes the miracle of bi-location. Of course in the true tradition of any religion with a textual basis, there is a good deal of written religious legalese parsing the exact definition of bi-location, but it nonetheless concludes that it is not impossible for a holy person to be seen in two places at once. And if we consider other practices around lucid dreaming, spirit-walking, astral travel and so on, there is a good deal of out-of-body experimentation taking place (whether we believe in it or not) in many different forms, through many different belief systems, further destabilizing our embodied sense of location.

Tacita Dean and Jeremy Millar’s book *Place* begins with a brief explication untangling the idea of place from the idea of location, as a way to enter the space of the topic. They say that, while place is used as a synonym for space, location, site or territory, the word carries with it descriptions of our relationship to the world around us. And they use the analogy that place is to landscape as what identity is to portraiture. Thus they enter their discourse of place through the idea of landscape and its connotations. [2] They reason that: A landscape, then, is the land transformed, whether through the physical act of inhabitation or enclosure, clearance or cultivation or the rather more conceptual transfiguration of human perception, regardless of whether this then becomes the basis for a map, a painting or a written account. [3] Applying this logic to their analogy, portraiture then is the conceptual and material shaping of an identity through representation, where identity becomes the sign and signifier, that thing making a claim for a reality.

Dean and Millar, having teased out that definition, leave us with the implicit idea of location as having a certain tactical and technological connotation that I believe implies a detached neutrality in its specificity. And when I think of the term in its many uses around geo-location and in the animal world of echo-location

(bats and dolphins in particular), science and technology has a prominent role in the supporting and shaping of discourses regarding ideas about location.

Enter the military-industrial complex's manufacturing of location (read: deception): shifting terrain, moving targets, dummy airfields, camouflage nets and stealth technologies. These practices bring me to the idea of concealing location. In the book *Hide and Seek*, author Hanna Rose Shell takes up the study of camouflage and photography as it relates to the military practice of reconnaissance. [4] Relating the fascinating story of American painter Abbott Thayer and his study of natural, animal camouflage, Shell writes:

"Thayer identified two distinct visual phenomena: 'obliterative countershading and 'disruptive patterning.' In the first, the parts of the animal lit brightest by the sun are consistently colored darkest, while those areas generally bathed in shadows are colored lightest. Witness the white bellies of wild rabbits or the silver undersides of sharks; the resulting visual compression of a three-dimensional form produces an illusion of monochrome flatness." [5] From Thayer's early curiosities and research, Shell goes on to trace the development of camouflage-producing divisions within both the American and British armies and their implementations in both world wars. Cloaking, obscuring location, is a necessary tactic for both animal and man, the success of which is mission critical.

Another prominent figure in her study is Len Lye who was charged with making a dramatized survival-training film by the British Army's Realist Film Unit. [6] The film depicts a mutual manhunt between a German sniper and a British sergeant. Set somewhere in a European forest, the two soldiers give chase to one another and make various attempts at creating field camouflage on their bodies using their wits, conditioned through field craft training, combined with what they could find in the forest. Shell writes: "This emergent form of multimedia practice, which I call 'dynamic camouflage' and which emerges in Lye's work, designates both a survival strategy focused on protective concealment of the mobile body within a changing environment, itself under filmic surveillance and a formulation of subjectivity, a form of consciousness adapted to that environment. It is founded on a specific logic of self-effacement that collapses the distinction between the filmed world and the natural (or protofilmic) world." [7] This concept of deception around strategic location, cloaking, masking, etc. has defined the last century of warfare in terms of its technological impact and remains highly relevant to both ongoing physical and virtual battles.

A quick search on the topic of invisibility reveals a Canadian company called Hyperstealth Biotechnology which has developed a technique called quantum stealth. [8] It involves bending light around a body or object, disrupting reflection such that the body or object mostly appears to disappear. Of course there are the well-known, low-profile airplanes like the stealth fighter and bomber

that are able to evade sophisticated radar detection. But this is different in that this technology potentially provides another layer of invisibility, that of the lens-based and of the naked eye. Camouflage and stealth technologies emphasize the importance of concealing location. And on the other hand, not being able to detect location is an eminent and potentially fatal threat.

And then there is the self-oblitative opossum that plays dead as if to say with closed eyes, if I can't see you or if you think I am dead, you can't hurt me. And to quote a refrain from the rock band Radiohead: "I'm not here. This isn't happening." [9] Like a frightened child with eyes closed tight wishing for invisibility or to transport away from danger, the child creates a territory, an imaginary safe space in harm's way. Artists demarcate, create space from nothing. From nowhere to somewhere, from location to place, philosophers Gilles Deleuze and Felix Guattari say: "The artist: the first person to set out a boundary stone or to make a mark. Property, collective or individual, is derived from that even when it is in the service of war and oppression. Property is fundamentally artistic because art is fundamentally poster, placard [...] The expressive is primary in relation to the possessive; expressive qualities or matters of expression, are necessarily appropriate and constitute a having more profound than being. [10] They, along with Elizabeth Grosz, have much more to say about territory (and deterritorialization) and it is particularly true that artists of all disciplines seem to instinctively create territory through a destabilization of place no matter the form it takes." [11]

ANYWHERE: ARTISTS AND ORDER WORDS

Re-enter artists and art and re-enter Dean and Millar's parsing of place. Many contemporary artists work in society's blurry spaces of discourse. The artists' whose work I will discuss next engages the overlap between the definitions of place and location highlighting the complex interplay between the two words and calls into question a whole host of assumptions about physical space and the shifting terrain of meaning on which it sits, especially in relation to duration and memory. I begin this part of the meander by jumping back to Deleuze and his work on the philosophy of Henri Bergson. In Deleuze's book *Bergsonism*, he restates (then later unpacks) Bergson's argument that "duration is essentially memory" [12]

If we ask what, in the final analysis, is the basis of this duality in duration, doubtless we find ourselves in a movement[...] by which the "present" that endures divides at each "instant" into two directions, one oriented and dilated toward the past, the other contracted, contracting toward the future. [13] What most interests me about this idea in the context of the common conflation of place and location is exactly memory. The cloud is memory. Taking Dean and Millar into consideration again, they write: "Place is thus space in which the process of remembrance continues to activate the past as something which, to quote the philosopher Henri Bergson, is 'lived and acted, rather than represented.'" [14] Using the ideas of Bergson and Deleuze in

this context allows for the idea of simultaneity where the past is present in every moment and that duration/memory is “in the final analysis, defined less by succession than by coexistence.” [15] And in this way simultaneity allows for the idea that place and location can (subjectively) be anywhere, anytime precisely because of this Bergsonian link to memory.

These concepts of memory, place and simultaneity bring me around to the relatively recently theorized and named artistic tactic known as *parafiction*. The most well known explication and classification of this tendency in late twentieth/early twenty-first century art is the 2009 Carrie Lambert-Beatty article *Make Believe: Parafiction and Plausibility*. [16] In this important essay she defines the term *parafiction*, asserting that, “It [parafiction] does not perform its procedures in the hygienic clinics of literature, but has one foot in the field of the real [...] these fictions are experienced as fact.” [17] She goes on to cite (and site) many prominent examples of this mode of making work from the *Atlas Group* to the *Yes Men* and analyzes how these works function, thereby laying a firm theoretical foundation for the further grouping of works under this term. [18]

Using her definition as a touchstone I would argue that for the work to be successful, it does not necessarily have to be experienced as fact and that ‘the real’ itself is a social construction which is made (f)actual through *mots d'ordre* (or order words) as defined by Gilles Deleuze and Felix Guattari. These types of words or phrases enact transformations that create the real from what was not real before. Therefore, the fiction can, if even for a moment, become real. This idea is very important in establishing what we believe (or perhaps, agree) to be reality and creates – if not creates, then confirms or reinforces – an instant power structure, a hierarchy to which we are subjected.

So what are *mots d'ordre*? The term is found in Deleuze and Guattari's essay, *November 20, 1923 – Postulates of Linguistics* from their well-known book of philosophy, *A Thousand Plateaus*. Very simply put, Deleuze and Guattari argue that language is not informational or communicational, but that by its nature is concerned with order and that it imposes: “Semiotic coordinates possessing all of the dual foundations of grammar (masculine-feminine, singular-plural, noun-verb, subject of the statement, subject of enunciation, etc.) The elementary unit of language – the statement – is the order word [...] Language is made not to be believed but to be obeyed and to compel obedience [...] A rule of grammar is a power marker before it is a syntactical marker [...] There are also intrinsic relations between speech and certain actions that are accomplished by saying them (the performative: I swear by saying “I swear”) and more generally between speech and certain actions that are accomplished in speaking (the illocutionary: I ask a question by saying “Is [...] ?” I make a promise by saying “I love you [...] ;” I give a command by using the imperative, etc.).” [19] Upon annunciation, we can transform a citizen into a suspect (“you are under arrest”); a suspect into a

convict (“I hereby sentence you to life in prison”). You can go from being promised to being married to being married (I hereby pronounce you [...]). You can even receive a pronouncement after you have died, as it is the state's duty to sanction the official recognition of your death – which obviously would have to happen sometime just after actual death. There is always an unknown duration. Therefore, you always die twice: once actually and then a second time officially. Quantum physics tells us that atomic particles transform from some location or state into another location/state. It is the quantum occurrence – electrons bouncing from state to state and from location to location in an imperceptible amount of time and vice versa. Imagine for a moment, the location of the black hole at the center of the Milky Way. Where is it exactly? Is the event horizon a more important location to be aware of (the point of no return)? If wormholes exist, how do they connect two locations? What is the shift in perception of time if one passes through alive? Where does the wormhole take the time traveler? The doppelganger as time traveler. When you get there, wherever there is, plant a flag in it. Like the moon, like Cabinetlandia (more on this in a moment). [20]

More to the point, in this transformative sense, location and condition are linked to states of being where one party enacts a declaration that changes the state of the place or the condition of a group or an individual. This is enacted most often through the power of language. And this is how I see power as the most important factor in location, because, in thinking of location, I always ask the question, what is being located, who is doing the locating and for what purpose? Take for example the project by the staff of Cabinet Magazine called *Cabinetlandia*. They bought a magazine shaped parcel of land out in the middle of the New Mexico desert and declared it to be its own kingdom. It was no-place until they declared it as one. Its location is not strategic, nor does it fit into the mantra of the three ‘L’s’ of how to invest in real estate: Location, Location, Location! This declaration of sovereignty (their utterance/declaration of order words) produces the desired effect. [21] And likely it will remain an unchallenged sovereign place until it comes up against another larger, more powerful sovereign body which may through its own order words dissolve the state the Cabinetlandians have declared as their own.

Back to art and artists, one could say that, perhaps earlier, but most certainly by the time the Dadaists came together in Zurich during WWI, the idea of interventionist strategies and tactics as artistic means had taken form in their experiments with collage, performance, collections of found objects, media pranks and installations a kind of proto-parafiction. These kinds of tactics seek to identify and locate ideologies, to mock them, to turn them on their heads, to undermine power. [22] Interestingly as well, the Dada group was (eventually) spread out over six different European cities where their modes of making work were transplanted, thereby making the location of this named movement and its practices diffuse, not only located in Zurich or even more specifically tied to the Cabaret Voltaire, enacting simultaneous

strategies, tactics and interventions to cumulative and critical (sometimes comical and absurd) effect. DADA was portable; it could go anywhere. From here it is very easy to find a precedent for contemporary artistic practice and Carrie Lambert Beatty's category of parafictional art.

Ilya Kabakov, though not necessarily a parafictional artist, is an artist who works with one foot in the real, the other in the fantastical. One is generally never fooled into thinking when encountering his art that you are not looking at art. However, you do get a sense that you may possibly be looking at a reality. By 'a reality' I mean an alternate reality or a view into someone's private world and who may or may not be just off in another room. For instance one of his most well-known works, "The man who flew into space from his apartment," gives one the distinct feeling that, through the specific collection and arrangement of objects, one is peering into a real person's room, but not only their room, but into their mental state just before they left the room. [23] While very different in tactic, strategy and execution from artists like the Yes Men, this type of work still leaves a bit of doubt on both sides of the fact/fiction binary. It is also of note that this particular work of Kabakov's is not site specific. So, in a sense, this lends itself more to the instant recognition of the "staged" feeling.

Circling back to Dean and Millar once again, the work of artist Gregor Schneider is featured in *Place*. The work they present, *Totes Haus ur*, is site-specific. Here is how they describe the work: "In 1985, the then sixteen-year-old German artist Gregor Schneider moved into a vacant apartment on the grounds of his father's lead foundry in Rheydt and began a process of continual alteration to the building that continues to this day. *Totes Haus ur* (Dead House ur) is a strange labyrinthine space that exists behind a tiled three-story façade, an insistent architectural reminder that Freud's uncanny, the *unheimlich*, is closely related to the homely or *heimlich*. Here walls are built in front of other identical walls, thereby rendering the changes perceptible, but unrecognizable. Often the new walls and floors are lined with a thick sound-insulating material such as lead, thereby altering the rooms' characteristics in other invisible ways, the increasingly oppressive atmosphere palpable nonetheless." [24] In this case, the work is site-specific, creating a place inside a place, one where the uncanny can be located as feeling. This insertion of interior space into another interior is very potent given its location on the grounds of an industrial site, one where people come and go, live, work and die. This work also engages the ideas about duration and memory, as discussed and considering that the project is ongoing, it continues to create and actualize simultaneous memories new and old, real and manufactured.

Another work in this same vein is *Hello Meth Lab in the Sun*, a collaboration between artists Alexandre Singh, Johan Freeman and Justin Lowe. [25] It was first installed at the Ballroom Marfa in 2008. It is a series of rooms designed to look like the interior of a house that has been converted into a crystal-meth-producing

laboratory. The images of the rooms deliver a similar effect to those of Schneider's and Kabakov's work and suggest the recent departure and eminent return of the fictional occupants. Not site specific by nature and not an intervention whereby the "one-foot in the real" is present, *Hello Meth Lab* [...] nonetheless delivers a potent sense of a very specific location alongside a close approximation of what the "real thing" might be like. In this way the work, again, parallels reality and is not so much fictitious or parafictional as it is a hyper-real representation of the ills of the society in which it is situated, something that could be anywhere: in your town, in your neighborhood, right next door.

Lastly in this meander, under the banner of 'Anywhere' falls the heterotopia. Michel Foucault introduced this rich concept in his work entitled *Of Other Spaces: Utopias and Heterotopias*. [26] Briefly explained, a heterotopia is a place or location where all elements of society can meet and are combined in a way that is unusual, self-contained and serves some kind of function that cannot take place in normal society. Some examples that Foucault uses are the cemetery, the boarding school (in its nineteenth century form), the military, gardens, brothels and colonies. I would like to consider a very contemporary example: the airport, in particular the Abu Dhabi airport which has an area that, if cleared, you may enter another country, that being the United States. It is known as the pre-clearance area and one must pass through and into it before boarding a plane to the USA. It is located in the basement of the airport and once you clear this area and enter the USA (while still being firmly in the UAE) you continue to your gate, which looks like all the other gates and is obviously still very much located in Abu Dhabi and in the UAE. This is another instance of the order word creating something from nothing and in this case declaring a place to occupy two spaces at once: a certain magic followed by a very long flight to the other part of the USA that is located nearly half-way across the globe. The arbitrariness of it all – you may as well be anywhere.

EVERYWHERE: UBIQUITY OF FICTION AND RESISTANCE

Landing here finally, on the idea of "everywhere," the complete dispersal of locations, brings us back to where we began with the so-called "cloud." When I think of the cloud and the web that connects us to it, I can imagine something that is always on, something that never sleeps or blinks, until it does. This is perhaps getting into the territory of the film *The Matrix*, where simultaneous realities exist, the one that appears to us and the other that is behind the scenes, the real reality which is, in the world of movies, terrifying and involves a superior race of aliens feeding on human life, while pacifying our minds with a hyper-real representation of normalized place through a highly sophisticated virtual reality, plugged directly into a socket in one's brain. This kind of ubiquity and homogenization, as it is manifest through a virtual location/dislocation, is reminiscent of Bergsonian duration in the sense that these parallel worlds of the actual and the virtual are always running in synchronization with one another.

It is possible to détourn anything that is a part of “the spectacle” that is the contemporary, mediated world. [27] And most, if not all of the work that Lambert-Beatty cites in her article can be categorized as a détournement, interruptive, interventionist and one might even argue ubiquitous as the work often uses media space to manifest, whether it be television news or advertising or even the space of a gallery as its carrier. Certainly the strategies of using very familiar forms of media as material is deceptive in that it places a layer of believability over what may or may not be a veiled critical commentary.

This ubiquity of form is troubling in that it works both ways. Via the media, those without a critical consciousness are implanted with counter-productive ideologies through repeated exposure to bad ideas and false problems. In fact, one does not have to stretch too far to create a fictional hyperbole that is already the actual fabric of the twenty-four hour news cycle. But clearly this is where the parafictional interruption is used as a strain of resistance against those ideologies and hyperboles that the artists find are in need of challenging and wrongs theatrically righted. Where these aforementioned artists site their work is, to them, where they think the work will be most effective in creating a different reality or at a least present a strain of resistance to the dominant narrative. Through their interruptive practices across various mediums and strategies, they effectively are using their own order words to bring other ideas into existence. When effective, the work causes a cognitive dissonance to arise, which can be found in its own kind of internal location, somewhere in, near or around one's “core values.”

And this is why the idea of location is such a loaded one. Whether the art is in a parafictional mode or in some other more liminal mode or location, actual or virtual, I believe that it is artists who are best equipped to perform these operations, to enact these strategies, to keep trying to activate the strain of resistance within our collective humanity through acts of destabilization that question ‘who’ has the power to proclaim the mots d'ordre that transform a location into a place.

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SHANGHAI EXPRESS – INTERACTIVE TRAVEL THROUGH COMPUTER GENERATED CITYSCAPES

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ABSTRACT

Shanghai Express is an interactive installation we developed for the *City of Counter Light* exhibition that was held at the Shanghai Power Station of Art in November 2013. In this installation users can generate cityscapes that appear on an interactive train window.

SHANGHAI EXPRESS

For *Shanghai Express* we created generative software that calculates and renders cityscapes in real time according to the users interaction parameters. In an installation that includes a screen resembling a train window, users sit perpendicular to a large interactive surface. As they move their hands across it, light patterns and buildings appear and digital cityscapes emerge. These are not pre-calculated, but instead develop according to the interactions of the visitors and the internal generative algorithms of our software.

RELATED WORKS

Shanghai Express can be compared to early computer art works which dealt with cityscapes, virtual travel and interactivity. The installation *The Night Landscape of the City*, created by György Kepes between 1967-1968, was about the iconography of urban life. This kinetic computer-controlled installation displayed constantly changing light patterns that simulated a city at night. [1] In 1969 Kepes produced an interactive installation called *Explorations* for the Smithsonian museum. It was made of a seven meter long pavement consisting of fluorescent lights beneath a polarized screen. When visitors walked on this screen, different light patterns appeared below their feet. [2] Kepes was one of the first artists to apply concepts of cybernetics and kinetism to architecture and urban planning.

Another inspiring installation was *The Bus*, which was created by the French artist Jean-Louis Boissier in 1984. This system consisted of “an interactive videodisk combined with sections of a bus which belonged to the RATP, the official Parisian transport network. “When a spectator stood in front of the section of the bus that included the ‘request stop’ button and a screen which had been substituted for one of the bus windows, he was at any moment able to arrest the flow of landscape images which unfolded on the route between Saint-Denis and Stains. He could then “visit” eighty inhabitants of that area, that is, he could enter into their private worlds via their family albums.” [3]

One of the first architects to apply the concept of generative design to architectural planning was Celestino Soddu, who did his work in the late 1980s. [4] He wrote generative software that can be employed to find various architectural solutions based on evolutionary programs. One of his applications used genetic

algorithms to find the best design solution for a commercial center in Rome. In another software program he reinterpreted the Italian Renaissance’s building code in order to attain optimal architectural results.

The concept of algorithmic architecture has recently become more popular, especially in the form of parametric architecture. Marco Vanucci states that “Some of the most relevant shifts in contemporary architectural discourse and practice are intrinsically connected with the evolution in computation techniques and software developments. [...] The introduction of parametric software packages into the world of architecture and structural engineering, despite being a fairly new paradigm, is already redefining the discipline from within.” Parametric architecture “shifts the role of the architect in the design process: from the design of specific shapes to the determination of those geometrical/algorithmic relationships describing the project and its components. The design shifts from drawing surfaces to setting up rules of interdependencies-genotypes – leading to potential differentiations – phenotypes.” This problem solving approach is very similar to Soddu’s optimal design solution concept for generative architecture in the late 1980s. [5]



Fig. 1. *Haze Express*, © 1999, Christa Sommerer & Laurent Mignonneau; users interacting with train window, Interaction 99, Gifu, Japan; supported by IAMAS, Japan.

Since 1992 we have also produced several interactive installations that deal with generative image processes, artificial life and interactivity. [6] In these systems users often determine and influence the evolution of various image and sound scenarios by means of their interactions. In 1999 we became interested in the correlation between landscape, architecture and interactivity. We created the interactive installation *Haze Express*; this system

consists of two interactive screens that resemble train windows. Users can touch any part of them. [7] When no interaction is taking place, simple abstract forms appear, which float across the train window from left to right or right to left. The more the user touches the window screen, however, the more complex these forms become. The precise place on the screen which the visitor touches as well as the frequency and speed of his hand movement influence the kind of image elements that are created. Genetic recombination of the image elements is used to continually generate new forms. The faster a hand slides over the window surface horizontally, the faster the landscape scrolls in the same direction. The movement of the images is arrested when the hand ceases to move while remaining in contact with the window's surface. In Figure 1, a snapshot of a situation resulting from the interaction of two users of *Haze Express* is presented.

SHANGHAI EXPRESS – DESCRIPTION

In November 2014 we decided to further develop the idea of a virtual journey through an abstract landscape for the *City of Counter Light* exhibition at the Shanghai Power Station of Art in China. We created the interactive installation *Shanghai Express*. This time we replaced the abstract organic shapes of *Haze Express* with a larger vocabulary of forms resembling architectural elements. In *Shanghai Express* several bases of building shapes can be grown in real time through our generative software. These bases are shown in Figure 2a. They can be triangles, rectangles, squares, circles, hexagons, octagons or any odd shapes.

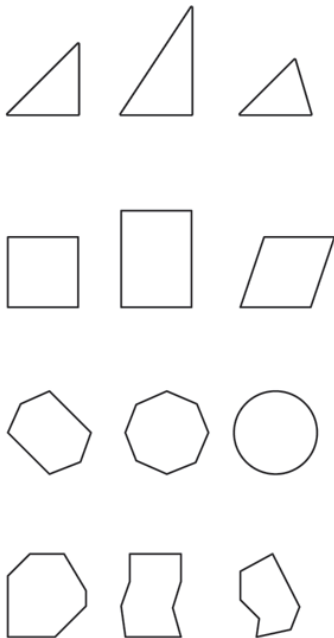


Fig. 2a. *Shanghai Express*, © 2013, Laurent Mignonneau & Christa Sommerer; examples of possible bases that can be grown.

These elements can also be extruded. Some extrusion results are shown in Figure 2b.

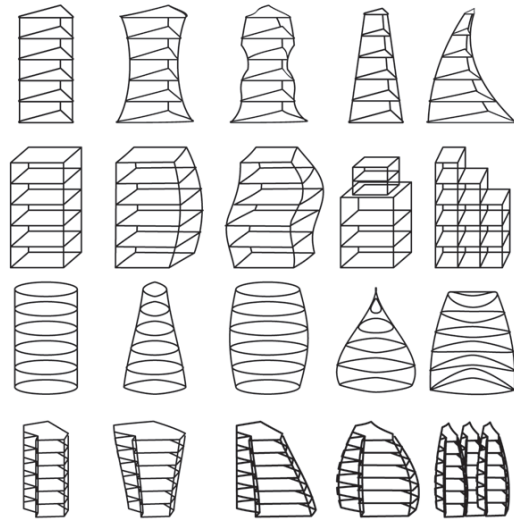


Fig. 2b. *Shanghai Express*, © 2013, Laurent Mignonneau & Christa Sommerer; extrusion examples.

The resulting shapes are again recombined to form elements that look like buildings, as shown in Figure 2c.

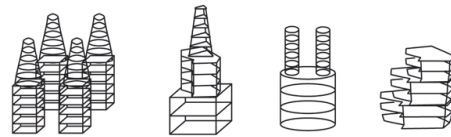


Fig. 2c. *Shanghai Express*, © 2013, Laurent Mignonneau & Christa Sommerer; recombination examples.

Another generative and algorithmic feature of our software is the window design; they can be transparent, have some internal lights, shading, glowing, mapping and colorizing effects. Examples of possible windows are shown in Figure 2d.



Fig. 2d. *Shanghai Express*, © 2013, Laurent Mignonneau & Christa Sommerer; window design possibilities.

Any parameter within all the building shapes and the windows can be modified and the exact decision which forms are generated or mutated, depend only on the user's interaction with our interactive window screen. The manner in which visitors touch the forms on the screen influences the generation of similar

shapes, which results from mutation and recombination. Figure 3 shows a snapshot of images generated on the *Shanghai Express* window.



Fig. 3. *Shanghai Express*, © 2013, Laurent Mignonneau & Christa Sommerer; several users creating abstract shapes.

Our parametric and generative software calculates these constantly changing landscapes and cityscapes, which can be quite abstract, but sometimes do strongly resemble cities at night. Figures 4 and 5 show snapshots of situations, in which users have recently interacted.

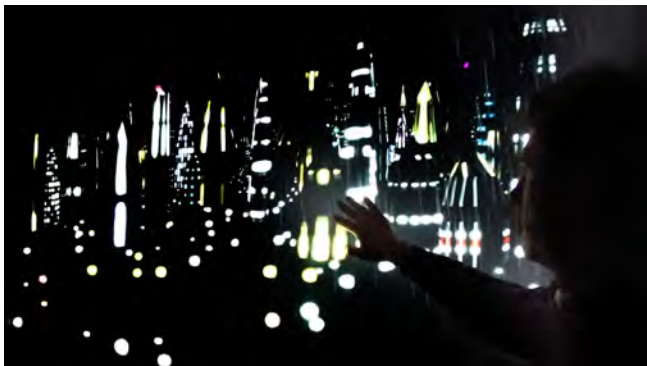


Fig. 4. *Shanghai Express*, © 2013, Laurent Mignonneau & Christa Sommerer; a user interacting with the train window.

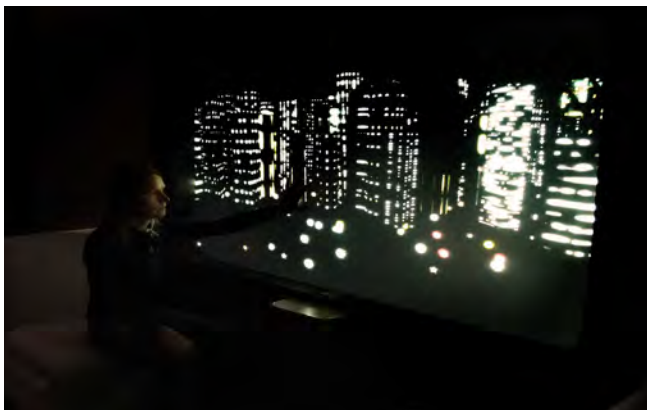


Fig. 5. *Shanghai Express*, © 2013, Laurent Mignonneau & Christa Sommerer; a user interacting with the train window.

Users of the system can also influence the train ride by making a sweeping motion with their hands in the desired direction. If they move in the same direction, they make the train move faster, but if they move the hands in opposite directions they can bring it to a standstill. The speed of the virtual journey depends on how fast the hands move. Multiple user hand detection is done through an in-house camera tracking and detection system, using infrared light and a back projection screen (Fig. 6a and Fig. 6b). The viewer feels that he or she is riding on a train because the images constantly move from left to right or right to left and the scenario is seen from the perspective of a person who is sitting perpendicular to a train window.

The complexity of the overall cityscape is directly linked to the users' interaction parameters. At an advanced level of interaction more than 10.000 buildings and 100.000 streetlights can appear, resulting in the formation of a complex image scenario. None of the visible images are pre-calculated; all the buildings are created just before the user sees them passing by and they are removed right after they leave the screen. As the virtual train ride continues, every combination of images becomes unique.

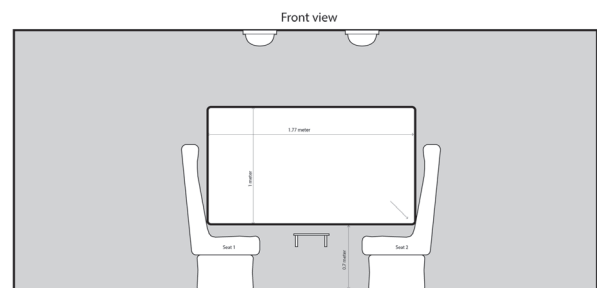


Fig. 6a. *Shanghai Express*, © 2013, Laurent Mignonneau & Christa Sommerer; diagram of the system from the frontal view.

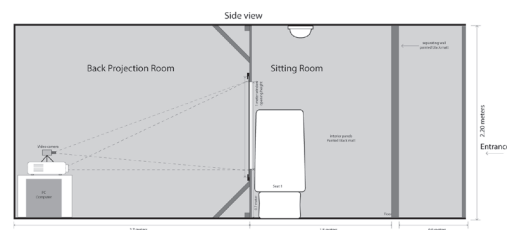


Fig. 6b. *Shanghai Express*, © 2013, Laurent Mignonneau & Christa Sommerer; diagram of the projection and camera detection system from the side view.

The viewpoint of the user (its precise vertical position; whether it is below or above the window or parallel to it), the sizes of the buildings and the way their windows are arranged, the layout of the city, the ambient lightning as well as the number of the street lights and their positions, are all influenced by the user's interaction parameters. These then determine what kind of image composition subsequently appears. As users sit back in their chairs and interact with the screen, they become aware of an

ever-changing cityscape that, although abstract, is still figurative. In the *Shanghai Express* system, interaction creates reality and engagement creates involvement.

SUMMARY

Shanghai Express deals with interactive art as well as algorithmic architecture. Its aim is not to create the best design solution for a given architectural problem, but rather to instill awareness of the city as a living organism. It invites the users to become involved in the creation of a real-time city that constantly changes and adapts by means of interaction. Aesthetically it can be linked to Kepes' *The Night Landscape of the City*, as it also talks about the iconography of cityscapes at night. [1]

Shanghai Express is embedded in our previous research on generative art. While our systems are mainly designed for an art context and are rooted in participatory and interactive art, correlations also exist with other areas such as human-computer interaction, interface design or, in the case of *Shanghai Express*, with experiments and writings based on ideas of the Digital Ground. [10], [11] They are also related to the kinds of interactive experiments, utopias and non-standard architecture that are described in the Future City context. [12]

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SPACE JUXTAPOSITION IN ARTS

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ABSTRACT

Space Juxtaposition in Arts suggests a modular structure that constructs and presents digital artworks related to spatial practice. This structure involves multi-layered space, interconnected modules and nomadic qualities. This paper discusses the discourses of site-specific art, cultural specificity and spatial practices in an artwork. The research analyzes characteristics of locative artworks, such as the unstable relationship between spatialized narrative and its site, the temporal shift in multilayered space and the significance of this modularity in an artwork.

Section One of this paper, Introduction, reveals the importance of the origin of locative art while presents a critical analysis of the art practice in the 1960s. Section Two, The Bonds, describes artistic approaches to everyday life and argues that elements from our everyday life in art projects as the bonds that connect each other. In Section Three, Characteristics of Locative Art, it suggests a new art discipline, which originates from site-specific art and provides a theoretical framework. This analytical structure manifests in technological advancement of mobile technology, spatialized narrative and its modular structure.

INTRODUCTION

Site-specific art practice usually refers to artworks that exist in a particular space. A famous quote from the minimalist artist, Richard Serra, reveals the essence of this art practice. In 1985, after a public hearing to determine whether his work *Tilted Arc* needed to be relocated, he remarked: "As I pointed out, *Tilted Arc* was conceived from the start as a site-specific sculpture and was not meant to be 'site-adjusted' or 'relocated.' Site-specific works deal with the environmental components of given places. The scale, size and location of site-specific works are determined by the topography of the site, be it urban, landscape or architecture enclosure. The works become part of the site and restructure both conceptually and perceptually the organization of it." [1]

However, Serra's definition of this practice remains controversial. Because many argue that site-specific art should apply to any artwork that is made in response to a site or interacts with any element of a site. In addition, this term site-specific art originates in the 1960s, defines the production, presentation and reception of artworks in conjunction with the idea of the site, its cultural and physical qualities. This includes light installations, sound installations, environmental art, public sculptures, dance performances and digital art, etc. Instead of discussing approaches that define site-specific artworks, this chapter focuses on the critical analysis of minimalist and conceptualist practices in site-specific art.

"Rather than 'establish its place,' the minimalist object emphasises a transitive definition of site, forcing a self-conscious

perception in which the viewer confronts her own effort 'to locate, to place' the work [...]." [2]

In the book *Site-specific art performance, place and documentation*, Nick Kaye shares his insights on site-specific practice by exploring Robert Morris' sculptural practice. He states that Morris' *Mirrored Cubes* (aka. Untitled), exhibited in the Museum of Modern Art, New York in 1965, penetrated into the gallery space and abstracted the outer space and inner space of the sculpture. Morris positioned four mirror plated cubes as if they are placed at the corners of a larger square. As such, the multiple layers of reflection were unavoidable. In Morris' cubes, the reflection of the gallery space became the site of the artwork, which includes the audience and viewers of the work. It presents the instability of the site, as the reflected images are constantly changing.

When compared with Serra's conceptual framework, Morris considers the fact that the site of an artwork is a space where people interact. Although Serra defended *Tilted Arc* and stated that site-specific art should not be 'site-adjusted' or 'relocated,' his earlier work *Shift* reveals the importance of the audience's participation and their spatial relationship with the artwork. "What I wanted was the dialectic between one's perception of the place in totality and one's relation to the field as walked." [3]

Shift redefines the viewers' perception of the landscape by placing concrete sections together in a zigzag pattern. Viewers or precisely those who penetrate into the space, perceive the terrain as a formless and undetermined structure. During nearly the same period in which Morris presented his *Mirrored Cube*, Hans Haacke presented *Condensation Cube* which engages with the natural environment of a site. Moisture at a unique time in the site where this transparent cube is placed, becomes the content of the work. Hence, invisible elements such as humidity, subtle changes in temperature and overall environment of the site changing constantly would eventually affect the form of the work.

NEW DEFINITION OF SITE

Site-specific art could be 'site-adjusted' as in the case with the above artworks, especially in terms of embracing different qualities that exist in the site. Whether the work can be 'relocated' depends heavily on how the word 'site' is defined in site-specific art, important concerns include: What is a site?, How has the site been constructed? and Where is the site?

"An existing space may outlive its original purpose and the *raison d'être* which determines its forms, functions and structures. It may thus in a sense become vacant and susceptible to being diverted, re-appropriated and put to a use quite different from its initial one." [4]

Henri Lefebvre's *Production of space* affirms space is never absolute and neutral. Instead, the construction of space is a complex and bidirectional process based on social values, human perception and spatial practices. Anthropologist Marc Augé conceived *non-places* as places of transience according to their usage and human spatial practices. [5] The theory stresses that spatial practices are more significant than the physical space itself. It defines location as the name of a place, whereas space is defined as the physical/ architectural form and an end-product of spatial practice. As a consequence, the word site should be interpreted in a straightforward fashion as a location or place or space of events. Each period's or culture's construction of site is re-defined on the grounds of relevant, dominant social norms, time or practice, but not on any claim to be the prior truth. In other words, the concept of site is temporary and volatile.

The pioneering sound artist, Max Neuhaus, created one of the very first telematic sound performances *Radio Net* in 1977. It was a closed-loop radio network, which propagated a radio signal from one transmitter in a city to that of another city in the United States. The two-hour performance adopted communication technologies as a bidirectional process. *Radio Net's* structure formed a cartography of radio wave spectra and an invisible landscape. We can see the technological advancement in this project and how technology affects an artwork's structure. The invisible network formed by multiple sites in this work, cannot be described by the theory of site-specificity, especially for Serra's rigid structure. Because a site in site-specific art usually refers to a certain space while this artwork was traveling across several places. The communication and interaction among audience in different places are inseparable to the artwork, so the connection among places and the idea of multiple sites become important, though none of the sites is superior.

As technology develops and art forms evolve, there are more and more artworks related to space and site which cannot be explained fully using Serra's theory. Recent digital art practices reveal the importance of shifting sociality in public spaces. They frame the virtual space as a place of events and social practice because this affects the way how we occupy space in the city. *Can You See Me Now?* was an urban game first exhibited at the b.tv festival 2002 in Sheffield, UK. It happened online and in the city at the same time. *Members of Blast Theory* (members) played against online players (avatars) in an online city. The game placed avatars at random locations on a virtual map while members appeared on the map according to their real time physical locations. The members tried to catch the avatars in real city space and they also exchanged information and tactics with others via walkie-talkies. Once they caught an avatar, they would take a photo of that particular location in real city space.

In *Can You See Me Now?*, the virtual map space and the idea of presence in this work suggest an insight. The virtual map exists on the internet, where cultural interaction happens. Meanwhile,

this map is an abstraction of the physical space, i.e. the cityscape. When the runners took pictures of places where they caught avatars, there is no doubt that the virtual players did not exist physically in those particular places. The spaces in this project are all superimposed, mixed up and blurred. Its site was a virtual map – an extension of the physical site. Yet, it engaged more people and created a network of complex, hybrid space, which could not be analyzed solely using the term site-specific. These spaces make a statement about what a site means in the twenty-first century. Site nowadays should be interpreted as a space of events and an end-product of spatial practice. In addition, this space can be either physical, virtual or hybrid, similar to where interactions happen in *Can You See Me Now?*.

On the contrary, *Milk Project* created by Esther Polak, Ieva Auzina and RIXC – at Riga Center for New Media Culture in 2004, utilized the same technology, but a different approach towards space. This locative art project traced the production and transportation process of milk from Latvian cows. The artists invited farmers and drivers to wear GPS devices, interpreted the resulting data and created routes of how the milk was delivered from the udders of cows to consumers' plates. The structure of this work is simple enough. For instance, the content of the work depended on how people deliver milk and the short stories involved. The stories were documented in both text and images, presented in the form of a video installation. It is concerned with what was happening on the route which had been derived from and defined by spatial practice; the route does not exist if there is no milk delivered and it is a site defined by actions and culture. Also, it is meaningless not to just read the stories as a whole as coherence will not be achieved and as a result, one may not understand that the work revolves around the delivery process of milk. In other words, the entire entity was made up of connected stories that happened along the milk line and these constructed the spatialized narrative, which was specific to the line. The art group regarded the work as landscape art instead of addressing any cultural and political statements. The traces of movement depicted the activities of the participants involved and none of them was omnipresent. Their collaborative force and technology facilitated the digital landscape art. In both *Can You See Me Now?* and *Milk Project*, there were hybrid forms of spaces and their sites were complex. The term site-specificity is too weak to describe their states of flux and nomadic qualities.

However, digital art nowadays deals with locations, spaces and sites that mostly originated from site-specific art in the 1960s. They extend the idea of location, site, spatial practice and space. Moreover, due to the invention of telematics and mobile technologies, the original framework cannot explain the innovative discipline entirely. Neither can the rigid one from Serra's *Tilted Arc* nor the mutable form from *Mirrored Cubes* and *Condensation Cube*. This paper is not concerned with defining site-specific art for today's digital art practices. On the contrary, it is concerned with suggesting a new form of art and discourse about how to

appreciate this form of art, a new genre – locative art. It is also concerned with the notion of what the relationships among sites are, what the relationship between the site/ context is and where the site(s) is/ are. Most digital artworks, in relation to space, sites and mobile technologies, encompass a number of invisible elements from their sites. This multi-faceted model is comprised of audience participation, historical backgrounds, collective memories as well as different form of spaces.

THE BONDS

Vito Acconci's *Following Piece* is a significant project in relation to art and everyday life practices in public spaces. Algorithms in art are sets of rules that artists create and during the process of art making; artists or softwares created by artists in digital art make decisions based on them. In this piece, Acconci's algorithm was first to pick random strangers on the streets, then until they disappeared and entered private spaces where he could not enter. This work was carried out every day for a month and he took video documentation. His own algorithm shows how artists contextualize public spaces and private spaces in art. It also emphasizes the uncontrollable nature of our movement in everyday life and public spaces. Acconci's algorithm decided his own movement in public spaces and this solely depended on actions of random strangers. This reflected how his movement and those related everyday life events were affected by external forces. In spite of ethical questions arising from this project, one of the major elements in the piece was role of the participants in public spaces and everyday life.

The multilayered space in his piece is worth paying attention to. When he was following his targets, he was aware that he was creating art. In other words, his space is an art space. However from his targets' perspective, the space is a public space. In this case, the contradictory definition of space proves that action defines space. Art originates from everyday life; it provides a channel and intersection between artists and their audience. Acconci's paradoxical structure framed the artwork and randomness in everyday life enriched its content. From collage paintings to performance and excursions, Dadaists embraced everyday life events as active ingredients in their practice. For example, Marcel Duchamp's famous ready-made sculpture *Fountain*. He exhibited an everyday life object, a standard urinal and signed it with a fake signature (R. Mutt). This artwork transformed what we normally regard as non-art into art. Besides Duchamp's anti-art innovation, Tzara and other Dadaists structured their works, especially for their performances and excursions, around the creation of an experience between dream and reality. Their claim of anti-art is the most ironic. They made art anti-art. Their lack of aesthetics becomes their aesthetics and also their manifestos.

"In documenting art on the basis of the supreme simplicity: novelty, we are human and true for the sake of amusement, impulsive, vibrant to crucify boredom [...] I write a manifesto and I want nothing, yet I say certain things and in principle I am against

manifestos, as I am also against principles [...] I write this manifesto to show that people can perform contrary actions together while taking one gulp of fresh air; I am against action, for continuous contradiction and for affirmation too, I am neither for or against because I hate common sense." [6] Similar to their claims stated above, the way they interpret common sense is ironic too. Elements from everyday life in their works are the common sense (Duchamp's urinal object for example) and through their anti-art process (by exhibiting the urinal object in a museum), the anti-art object becomes art. The process involves setting up a situation and an experience which originates from everyday life and deconstructing it at the same time. Although art critics criticize their bankruptcy in aesthetics (this is what they were aiming for), their innovation in creating new forms of experience and influence on their successors – Surrealism, Situationist International and Conceptual Art – cannot be ignored.

ART AND EVERYDAY LIFE

Social activists or interventionists provoke their audience by presenting didactic messages and activate social changes, normally in public spaces. There are fundamental differences between this practice and artworks that involve public spaces. Art projects that involve public space do not necessarily aim for social change. Claes Oldenburg and Coosje van Bruggen transform everyday life objects and stereotypical objects into large public sculptures, such as *Balancing Tools* in Germany and *Cupid's Span* in San Francisco. Their monumental sculptures situated in different cities transform the public's perception of what sculptures are. The artists alter the scale of ordinary objects and these iconic images are often freely associated or have multiple meanings. These sculptures should be viewed as pure forms of objects, as monuments in public spaces that juxtapose with our everyday life. City spaces are stages of everyday life; they are full of meanings and are constantly being written or re-written. Hence, we regard cities (i.e. open public spaces) as spaces of everyday life events.

Spaces in everyday life are similar to these objects and they often can be rendered as different acts and be re-written. Sense of space and its definition are highly subjective and names of spaces are usually decided by urban planners, governments and authorities. As mentioned previously, Marc Augé stresses spatial practice of a certain space is far more important than that physical space. Hence a sense of space developed by a particular person depends on his/ her perception, memory of that space and practice in that space. Meanings and representations of spaces in everyday life are no longer static. The manifestation of each artwork is different from another and often merely depends on what kind of element in our everyday life has been selected. In 1998, French art critic Nicolas Bourriaud suggested the term *relational art*, which defined as art practice concerned with communities, human relations and social context. This art practice stands against art practices which concern an independent and private space. Since

relational art consists of a structure formed by collectivity and elements from our society, he also stated that methods of connecting each elements together become less visible.

“Art keeps together moments of subjectivity associated with singular experiences, be it Cezanne’s apples or Buren’s striped structures. The composition of this bonding agent, whereby encountering atoms manage to form a word, is, needless to say, dependent on the historical context. What today’s informed public understands by ‘keeping together’ is not the same thing that this public imagined back in the nineteenth century. Today, the ‘glue’ is less obvious as our visual experience has become more complex, enriched by a century of photographic images, then cinematography (introduction of the sequence shot as a new dynamic unity), thus enabling us to recognize the ‘world’ as a collection of disparate elements (installation, for instance) that no unifying matter, no bronze, links.” [7]

Bourriaud’s definition of ‘glue’ can be seen as methods that artists select events and how they connect them together. Public space can also be regarded as a pool which is filled with everyday life events. Artists, such as Acconci, Claes Oldenburg and Coosje van Bruggen, have selected objects and events to form the bonds. According to Bourriaud, the bonds become more complex and they are not restricted to visual elements. Everyday life is an active ingredient in forming the bonds. There are no objections to how art relates to our society or it is a part of our culture, although revealing this relationship is not necessarily the ultimate goal. Instead, art should be unique and distinct in creating an experience.

Jacques Tati’s film *Playtime*, is a perfect example of how visual and aural rhythms with futuristic everyday life experiences are synergized. It has been described as plotless and without stories, in contrast to those films with clear narratives and formalistic structures. Tati positions us in his rigid, technological and futuristic world and portrays the life of the main character (Hulot) as humorous and a person who fails at life. Hulot finds himself full of curiosity in this world, unlike other characters in the film. In the scene that shows he is waiting for a job interview, Tati emphasizes the sound of a telecommunication machine, stepping sound of an employee and the sound from a sofa, which Hulot sits on.

Cinema is a form of mirror, not absolutely accurate but selectively magnified and amplified. In *Playtime*, the bonds, in Bourriaud’s term, especially in the scene mentioned, were those details in everyday life which often ignored by us. Tati emphasizes this surrealism of sound in our everyday life and this goes beyond what Bourriaud called ‘cinematography (introduction of the sequence shot as a new dynamic unity),’ instead, he creates new relationships among our everyday life, sound and visual images. The bonds turn invisible and more complex in installation art, as Bourriaud mentioned and it is also true in new media art. *Milk Project*, referred earlier in Introduction, reveals different disparate elements keep together and forms a unique world. Participants

from different locations along the milk line told stories about how milk was delivered and these stories rewrote meanings of locations. One of the stories told by Janis Simons (one of the participants), who is a milk farm, showed his work schedule in a particular day. On the web archive of this project, artists chose not to show the names of participants’ locations (e.g Janis Simons’), instead, they showed their GPS coordinates, animations of their recorded movements and their stories in text. The audience perceive participants’ locations as spots along the milk line and these spots are spots of memories and cultural practice in this project. The names of locations are no longer important to audience. Meanwhile, all spots are bonded through actions and movements of the participants and this bonds are invisible and inaudible.

From dadaism, film to new media art and locative media, artists select events in everyday life and create selectively magnified worlds, the space in these worlds can be multilayered, contradictory and overlapping. This includes actions, visual, aural, cultural and psychological elements. Most of them manipulate events in everyday life as content of their works but their strategies, structures and approaches are different.

CHARACTERISTICS OF LOCATIVE ART

The term ‘Locative Media,’ coined by Karlis Kalnins, refers to digital art practices in relation to either physical, cultural, epistemological or contextual elements or ubiquitous technologies. [8] Before the birth of the term, art practices from Thomas Philipoteaux’s paintings to Waag Society’s *Amsterdam Realtime*, revealed the engagement of locative-ness in various art practices.

In most of the locative artworks, artists concern with spatial relationship, rather than the space or the site itself. But due to our more complex sensory experience nowadays, the audience no longer sees the artworks to be happening in nineteenth century. They become active in viewing the artworks. Waag Society, Esther Polak and Jeroen Kee created the project *Amsterdam Realtime* in 2001. Public audiences in Amsterdam were invited to be equipped with a portable tracer device developed by Waag Society. The devices kept track of their positions by using GPS technology and data synchronized with that stored in a central server in realtime. The visualized data would then be shown on a map. The map does not contain any streets names, landmarks or buildings. Instead, it contains traces of human movements. Another locative sound art example, Christina Kubisch chooses the invisible electromagnetic waves in *Electrical Walk* and creates sonic narratives within different cities. *Electrical Walk* is an outdoor installation which consists of lots of electrical wires. It employs custom made headphones that detect inaudible electromagnetic waves emitted by both wires and different objects in the city, such as ambulances, neon lights and convert them into sound. The project has been exhibited in various cities.

MULTILAYERED SPACE

Anthony Dunne and Fiona Raby described hertzian space as an interface between human and electrical devices. "We are experiencing a new kind of connection to our artificial environment. The electronic object spread over many frequencies of the electromagnetic spectrum, partly visible, partly not. Sense organs function as transducers, converting environmental energy into neutral signals." [9]

In Kubisch's work, technology used in different sites are the same and different sites and cities and movements from the audience enrich the content with the invisible, 'hertzian' space. This unique sonic experience differs from one location to another. In other words, the most important elements of an artwork are how the artwork is structured around the idea of spatial practice and how different locations affect the artwork but not the kind of high-end technology involved. Kubisch's piece cannot be located inside a gallery or museum and most of the locations that she chooses are cities. These cities provide rich spectra of electromagnetic waves. In each city, the sound is different from one to the other, though the technology used are the same. The sound foregrounds the importance of everyday life, spatial practice, the 'hertzian' space and how the electromagnetic spectrum in a particular location affects the work as a whole. In her work, sites are important but they are not site-specific, because the 'hertzian' space is volatile and invisible. The space itself is in a state of flux and the sites are important to the work due to the activities of electromagnetic spectra happen there, in other words, the spatial practice in a particular site is important, rather than the physical space.

As Kubisch situates the work in different public spaces, this giving a more complex structure. She relocates the artwork and the audience in *Electrical Walks* transforms the public space into an art space together with the artist, through their movements in the city. A more recent example of locative art is *Serendipitor* by Mark Shepard. This iPhone navigation app provides alternative routes to users and suggests actions, such as taking a photo, picking a flower. Users enter an origin and a destination, then the app will map a route between them. They can also choose to increase or decrease the complexity of the routes. When users reach the destinations, they can choose to send emails and share their routes and steps they took with others.

This work adopts a similar approach to Kubisch's. Spatial practices in both projects are the active ingredients. Shepard even gives more freedom to users and due to the technological advancement, the users can now experience the artwork wherever they are. The iPhone app provides alternative routes for the users and presents another kind of cartography, which differs from normal routes provided by online map applications. Those routes are usually longer than we normally take and encourage users to explore our environment in everyday lives. Yet, this personal experience has been guided by some simple instructions in the app.

Serendipitor is another example of how art transforms space and sites of the artwork become indistinct.

In Acconci's *Following*, the artist experienced the art space that is created by himself while others, such as persons he followed, experienced an everyday life public space. This concept expands in *Serendipitor*, since users experience and create art spaces, together with the artist. These spaces are multilayered and overlapped. Furthermore, sites in this artwork could be anywhere in the world with an internet connection, hence its sites are hybrid in form. In addition to Karlis Kalnins' definition of locative media, one of the unique characteristic of locative art is how artists include everyday life events, i.e. actions in public space. Artists structure these events in order to transform the public space as well as the spatial relationship between the artwork and the audience.

MODULARITY

A similar practice to locative art is telematic art. It is defined as artworks adopting telematic technology, such as the mobile phone and other telecommunication devices. One of the telematics artworks, Heath Bunting's *Kings Cross Phone-In* in 1994, opened up new possibilities of performance art and the participants were aware of their actions. Bunting created a webpage, described the project and what people needed to do if they wanted to join the project. He also listed a pay phone number at Kings Cross station he would call during the performance. The artist observed the listed phone numbers' activities at the station and summarized events into a written report. Kings Cross in London became the main site of the piece while the distributed network covered locations where people telephone in. This work emphasizes the communities and the network but in actual fact, it had a main, central site. No other sites were superior to the main site. On the contrary, in Shepard's work, all users' inputs are important and the sites (users' locations) in the network are equally important.

Internet art is distinguished by real-time and virtual space while in locative art, such as *Serendipitor*, the transient and mobile natures stand out. In *Serendipitor*, there are multiple sites involved and qualities of different locations are highly important. However, the definition of site in locative art is no longer limited to physical, discrete spaces. Instead, it may involve 'hertzian,' virtual or hybrid space. Furthermore, qualities of different locations, i.e. audiences' actions and the environment, are constantly changing, hence these qualities affect the user's experience in *Serendipitor*. Another feature of this kind of art is modularity and in *Serendipitor*, each user's interaction in a location can be considered as a module. This modular structure, which outlined in a book of Lev Manovich as one of the principles of new media. The established media art scholar depicts a new form of media art in terms of content and structure. He states: "This principle can be called 'fractal structure of new media.' Just as a fractal has the same structure on different scales, a new media object has the same modular structure throughout. Media elements, be it images, sounds, shapes or behaviors, are represented as collections of

discrete samples (pixels, polygons, voxels, characters, scripts). These elements are assembled into larger-scale objects but they continue to maintain their separate identity. The objects themselves can be combined into even larger objects -- again, without losing their independence." [10] But modularity in locative art goes beyond what Manovich describes. With the development of internet technology and wireless communication, artworks existing simultaneously in different spaces is possible. In locative art, due to its transient and mobile nature, chance events usually occurs. When art becomes more open-ended and volatile, authorship in traditional art forms turns invisible. The experience created by locative art depends on how artists select events in everyday life, as mentioned previously. It also depends on how they put them together and what the 'glue' is, according to Bourriaud. As we can see in the *Milk Project*, mentioned in Session 1, the artists limited the way how traces had been created. The group looked for specific content and qualities of narratives through interviews. Hence, different micro-narratives, told by different persons involved in the milk line, such as drivers and milk farm, in the project were delivered successfully to the audience in the gallery. Each micro-narrative in this artwork can be regarded as a module and all modules are well-glued by the milk line which is a cultural practice – a typical example of how action defines site.

In *Milk Project*, each micro-narrative can be read as an individual story of everyday life and by combining those narratives together through artists' choice, it forms "fractal structure of new media," in Manovich's term. But this modular structure in locative art does not solely exist in one, discrete place, instead, all modules are spread out in all kind of spaces.

CONCLUSION

The rigid definition of site is no longer valid. Our space, everyday life and culture are all in the state of volatility. Art is a selectively magnified artifact of our world and artworks, especially if it is in relation to ideas of space (in whatever forms and media) and digital cultures. It is believed that the modular structure as suggested – will be a role model for locative art. As the rigid concept of site diminishes and most of the locative artworks are concerned with our culture, spatial practices and city space, fragmented experience in the modular structure created by mobile technology should be inter-connected and originated from our everyday life events. The modular structure suggested here bonds all fragments together via both form and content. The 'glue' usually contains invisible elements; it is imagined or re-created by the audience.

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THE JAZEERA AL HAMRA DIGITAL HERITAGE PROJECT: A MODEL FOR DIGITALLY PRESERVING THE HERITAGE OF THE ARABIAN PENINSULA

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ABSTRACT

The digital environment offers an opportunity to establish a museum model that supports contemporary museum thought in regard to collective memory strategies, inclusivity and equity of tangible and intangible cultural heritage. Al Jazeera Al Hamra, a former coastal village in the Emirate of Ras Al Khaimah, UAE, was abandoned at the time of the formation of the country in the late 1960s and 1970s. It is considered one of the last traditional fishing and pearl diving villages in the nation. As the buildings are now only remnants of a time past, not only does the architecture need to be documented and mapped, but also the stories and traditions of the people who once lived there need to be recorded. Creating a web-based virtual environment that documents both the tangible and intangible cultural heritage of Al Jazeera Al Hamra can provide a cohesive physical and social record for future generations after the buildings and the people who inhabited the town are gone. Focusing on Al Jazeera Al Hamra, an at-risk site, this paper presents a model for digitally preserving and re-presenting tangible and intangible cultural heritage of the Arabian Peninsula and beyond.



Fig. 1. Bird's Eye view of Al Jazeera Al Hamra, 2009. Photograph © Seth Thompson.

INTRODUCTION

The introduction of oil wealth into the economies of the countries of the Arabian Peninsula in the 1950s and 1960s began a dramatic cultural and economic shift – catapulting an under-known and financially modest region into “modernization” driven by opportunity and ambition which has changed the cultural landscape significantly. Crisis is usually equated with conflict and natural disasters, but in the case of the Arabian Peninsula region, there is another kind of crisis that is a result of accelerated modernization coupled with a lack of cultural heritage documentation. The greatest threat of loss of identity is not necessarily by way of globalization or intercultural exchange, as this kind of change is inevitable, but rather the lack

of documentation and preservation of its cultural heritage – both the tangible and intangible. Over the past four decades, the United Arab Emirates (UAE), one of the countries located within the Arabian Peninsula, has embarked on a transformation that has substantially changed its cultural landscape. From a predominantly Bedouin culture in which people lived in both ephemeral structures as well as more modest permanent ones to a landscape of skyscrapers and grand buildings, the UAE's investment in its new infrastructure reconfirms its ambitious plans for itself. This transformation has placed an emphasis on the preservation of past material culture and the creation of a new identity for the UAE through its endeavor to acquire a global contemporary architecture, which is especially evident in the emirates of Dubai and Abu Dhabi. From the time that the United Arab Emirates introduced its first museum in 1971, the Al Ain National Museum, the country has invested significantly in the development of its cultural infrastructure and has now established museums in all seven emirates. However, the predominant wealth of the UAE's culture does not necessarily reside in its material artifacts, but rather in its rich intangible cultural heritage such as storytelling, dance, poetry and rituals, which also needs to be preserved.

Al Jazeera Al Hamra, a former coastal village in Ras Al Khaimah in the United Arab Emirates, was abandoned at the time of the formation of the country in the late 1960s and 1970s. It is considered one of the last traditional towns in the nation. Once an active fishing and pearl diving community, Al Jazeera Al Hamra consists of a fort (*hisn*), several mosques, a market (*souq*) and over 100 houses, including a wind tower house. A wind tower is an architectural device used to capture wind in order to cool a house. It should be noted that some of the structures within the village are constructed of coral and gypsum. As the buildings are now only remnants of a time past, not only does the architecture need to be documented and mapped, but also the stories and traditions of the people who once lived there need to be recorded.

The digital environment offers an opportunity to establish a museum model that supports contemporary museum thought in regard to collective memory strategies, inclusivity and equity of tangible and intangible cultural heritage. Creating a web-based virtual environment that provides documentation of both the tangible and intangible cultural heritage of Al Jazeera Al Hamra can provide a cohesive physical and social record of a traditional fishing and pearling village for future generations after the buildings and the people who had inhabited the town are gone. In addition to presenting an intuitive and relatively inexpensive model to implement for digitally preserving and re-presenting tangible and intangible cultural heritage using Al Jazeera Al Hamra, an at-risk site, this paper will address the kinds of “artifacts” that

are to be collected and cataloged. It will also take into consideration the project's long-term digital sustainability and show how this computer-based participatory model falls within the guise of socially engaged art.



Fig. 2. Mosque with Conical Minaret, 2009. Photograph © Seth Thompson.

AL JAZEERA AL HAMRA, CULTURAL HERITAGE AND THE NOTION OF IDENTITY

Cultural heritage, both tangible and intangible, contributes to the sense of identity of a place and represents the character and distinctiveness of its people. Ritual and materiality within a community appear to be benchmarks of intellectual sophistication within the assessment of a culture. Traditionally, when preserving a culture, emphasis has been primarily concerned with the tangible and it appears that the intangible aspects of the culture often become either secondary or mute. Intangible cultural heritage is defined as “heritage that is embodied in people rather than in inanimate objects.” [1] This includes oral traditions, music, dance, social practices, rituals and traditional craftsmanship, which is transmitted from one generation to the next and is an important aspect of community identity. [2]

Intangible cultural heritage is difficult to commodify culturally, as it is ephemeral. The measurement of its sophistication appears to be based on the residue of memory or the remaining supportive material objects. If the material objects did not last or did not exist to reinvigorate memory, it could be easily considered less sophisticated or irrelevant to a culture's long-term identity even though the ritual or tradition may have played an important role within the community at a particular time, defining its people culturally. As the region's museum professionals and researchers grapple with how they may document, collect and disseminate intangible cultural heritage, a re-examination of how heritage and cultural artifacts are cataloged, represented and interpreted within a museum context needs to be carefully considered. A virtual environment may be the most appropriate place to preserve and disseminate these cultural artifacts. Al Jazeera Al Hamra, which means “red island,” is considered one of the last traditional coastal villages in the United Arab Emirates. [3] An aerial view allows one to see the original “red island” among the sea of white infill sand

that now surrounds Al Jazeera Al Hamra, connecting it to the Ras Al Khaimah mainland. It should be noted that today, the area known as Al Jazeera Al Hamra is divided into two parts: the old settlement, which is the residue of the former three-kilometer island – the focus of this paper and model – and the new modern village that sits beside it. In the late 1960s and 1970s, many of the residents left for either nearby residence in Ras Al Khaimah or the emirate of Abu Dhabi, which offered more modern amenities. Due to the wishes of the families who once lived there, the buildings have not been demolished and remain relatively intact. [4] Consequently, Al Jazeera Al Hamra provides a snapshot of a traditional Emirati coastal town that has been fairly unspoiled since its original inhabitants left.

While remnants remain of the introduction of electricity, automobiles and various building materials used over the late nineteenth and through the twentieth century – such as coral, gypsum and concrete block – this unique setting offers insight into how coastal village life, with courtyard houses, mosques and a souq, were mainstays of the urban tissue before UAE citizens transitioned to inhabiting air-conditioned villas and shopping malls. The deserted village's densely knit courtyard houses stand close together, separated by vein-like narrow pathways called *sikkas* that run throughout the town, providing shade and at times a gentle breeze for the inhabitants as they conducted their day-to-day activities. Mosques were conveniently situated throughout the community for worship and prayer. Located on the northern part of the former island are remnants of a souq that stood along the original coastline. Very little written or photographic documentation exists on Al Jazeera Al Hamra. Much of its history remains in the skeletal remnants of the village and the hearts and minds of the people who once lived there. In the book, *From Rags to Riches: A Story of Abu Dhabi*, Mohammed Al-Fahim writes:

The peoples of the Arabian Peninsula have long been blessed with a rich oral tradition through which knowledge, experience and wisdom are passed from one generation to the next. Many of the important events of our history are not recorded anywhere but in the memories of our people. They live on in the stories, myths and legends that our sons and daughters are told by senior family members. Woven together, these stories form the colourful tapestry of our past. [5]

Al Fahim continues:

Countless generations of our people have lived and died without a trace because there are no written records of their lives and achievements [...] Although our rich history goes back many centuries, only bits and pieces of the last several decades have been written by our own historians and scholars. We are in a lamentable position. We must study the past from the perspective of foreigners, using their old documents and photographs in our research. The past as seen through the eyes of our own ancestors is lost forever, simply because most of our fathers and their fathers could not read nor write. [6]

While globalization and intercultural exchange have been cited as the culprits for the region's loss of identity due to the import of outside businesses and dominance of foreign workers within the countries of this region, the real threats, in this author's opinion, are (1) lack of heritage documentation, (2) missed opportunities due to the passage of time to document existing heritage traditions through oral history collection and video documentation and (3) a lack of a mature infrastructure for the preservation and dissemination of cultural heritage that establishes equity in regard to the tangible and intangible.



Fig. 3. *Pearl Merchant's Home*, 2009. Photograph © Seth Thompson.

PRESERVING HERITAGE DIGITALLY USING A MODEL THAT PROMOTES INCLUSIVITY

With the introduction of digital media and the Internet in the early 1990s into the mainstream cultural landscape, museums began to consider new opportunities for re-presenting, managing and disseminating cultural heritage content – both the tangible and intangible. With current digital media technologies, one can create cultural content using imaging, modelling and archiving methodologies in conjunction with database management tools to examine cultural heritage content in a number of different ways. [7] Additionally, new exhibition models for understanding and experiencing heritage are emerging as a result of novel social practices of collection, representation and communication that are enabled by digital media technologies such as social media. [8] Digital curation often involves the collection, preservation and dissemination of digital assets, which may have analog or digital origins, using information technologies. [9] For the purposes of this paper, this author will be focusing on a web-based “virtual museum” model for the preservation and dissemination of cultural heritage.

The World Wide Web is one of the most promising of the digital media tools for cultural heritage dissemination, as it is an information-broadcasting tool that enables collaboration and interaction between individuals across and within a global community. Drawing upon notions of contemporary museum theory, web 2.0 and hypermedia narratives for cultural heritage preservation, the model presented in this paper supports the

following ideas: collective memory, inclusivity and equity of tangible and intangible culture heritage.

Virtual Museum Model

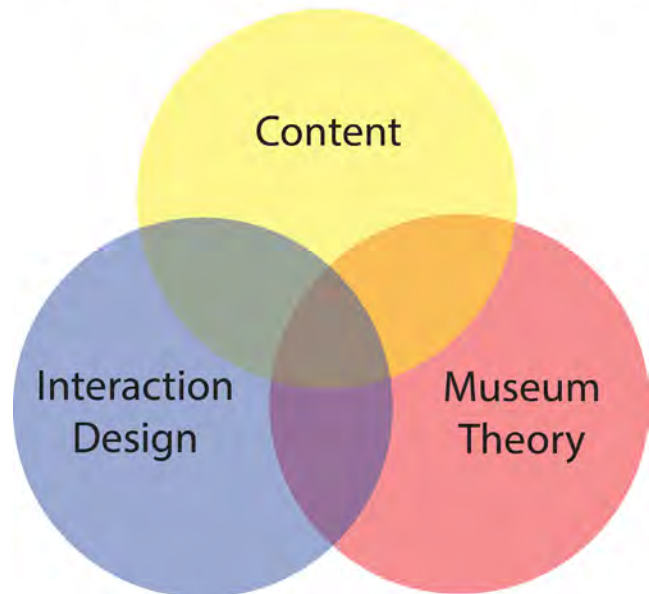


Fig. 4. Illustration by the Author. Photograph © Seth Thompson.

Departing from an exclusively authoritative exhibition model used in most traditional museums settings to an inclusive one where collective memory is encouraged allows for a new model for cultural heritage preservation to emerge. In this model, the role of the “curator” changes from an authoritative voice to “facilitator” who is a protector of the exhibition or project’s mission – enabling a collaboratively created and participant-driven recording of a community’s cultural heritage. With both the tangible and intangible cultural heritage converted into media objects (e.g., text blocks, images and/or video), one no longer takes precedence over the other – creating an equality that has been absent in many museum exhibitions, as the intangible has traditionally been considered support material or context to the material object. As Lev Manovich points out in *The Language of New Media*, “media objects do not tell stories; they do not have a beginning or end; in fact, they do not have any development, thematically, formally or otherwise that would organize their elements into a sequence. Instead, they are collections of individual items, with every item possessing the same significance as any other.” [10]

The notion of database and hypermedia narrative are essential for the search and discovery elements of this project model. While a hypermedia structure is open ended, a hypermedia narrative is the linking of media objects within a database that forms a narrative through associations. Using hypermedia can strengthen the social dimension of tangible cultural heritage by linking

individuals' stories and histories to that of a larger context of place and time. In the essay, *Database as a Genre of New Media*, Lev Manovich writes, "The 'user' of a narrative is traversing a database, following links between its records as established by the database's creator. An interactive narrative (which can be also called 'hyper-narrative' in analogy with hypertext) can be understood as the sum of multiple trajectories through a database. A traditional linear narrative is one, among many other, possible trajectories." [11]

In the essay, *Modular Visions: Referents, Context and Strategies for Database Open Media Works*, Fabian Wagmister argues that digital audio-visual databases in conjunction with interactive techniques potentially offer a paradigm shift in the way media works are conceived and produced, which is radically different from the authoritarian structure of modern cinema. He writes, "these redefined processes permit an open communications (creation and viewing) environment in which the power relationships involved in the construction of meaning are multidirectional and multidimensional." [12] This idea can also be applied to the notion of digitally preserving heritage, creating new museum/exhibition models that not only fluidly intermix both the tangible and intangible cultural heritage, which has been difficult to do within a traditional museum context, but also empowers the user/participant to create his or her own narrative from the material provided – much like a traditional democratic exhibition where the museumgoer chooses what and how long he or she will spend with the material on view.



Fig. 5. *Fort (Hisn)*, 2009. Photograph © Seth Thompson.

THE JAZEERA AL HAMRA DIGITAL HERITAGE PROJECT MODEL

The model presented in this paper stems from both contemporary museum theory and the arts practice known as *socially engaged art* or *social practice*. [13] Socially engaged art is multidisciplinary, participatory in nature and requires the involvement of others. [14] The goal of this model is to create a platform for a dynamic exchange of interrelated oral histories and artifacts about a time and place that survives primarily within the community's collective

memories and architectural remnants. Participants of the project can become co-authors, editors and/or observers. In regard to the model's platform as a digital medium, Christiane Paul writes, "Participation and collaboration are inherent to the networked digital medium[...] The artist becomes a mediatory agent and facilitator – both for collaboration with other artists and for audiences' interaction with and contribution to the artwork. Any new media artist who creates a system that is open to public contribution has to consider the 'socialization' of the work." [15] This model as a completed project would be a social sculpture using documentation of Al Jazeera Al Hamra's architectural remnants oral histories and historical photographs to create a cohesive physical and social record of a traditional fishing and pearling village for future generations after the buildings and the people who inhabited the town are gone.

Virtual Museum Collaborative Environment

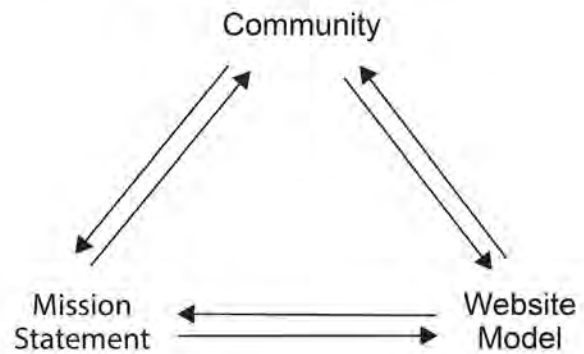


Fig. 6. Illustration by the Author. © Seth Thompson.

For these types of initiatives, involving the community and its stakeholders in the developmental process will potentially generate a more invested dialogue between the project and its community. Acceptance, trust and mutual respect between the "curator" and the community are at the heart of this model's design. [16] Nevertheless, with a project such as this, it requires a clearly defined mission along with lucid objectives and goals, so that the vision and parameters of the collection are maintained. Using a site map and documentation of the current site – a metaphor and reminder that if the history is not preserved, it can be easily lost – as a point of departure, *The Jazeera Al Hamra Virtual Digital Heritage Project* presents a people-centered model for the preservation of Al Jazeera Al Hamra's cultural heritage. Utilizing an interactive interface, this project is a portal and database of photographs, 360-degree vr panoramas, text and video presenting the history, traditions and stories behind both the material and social culture of Al Jazeera Al Hamra. The framework provides both indexed and exploratory modules. The indexed module allows for keyword searches and reference information to be directly retrieved, while the exploratory module provides a search-and-discover navigation based on associations.

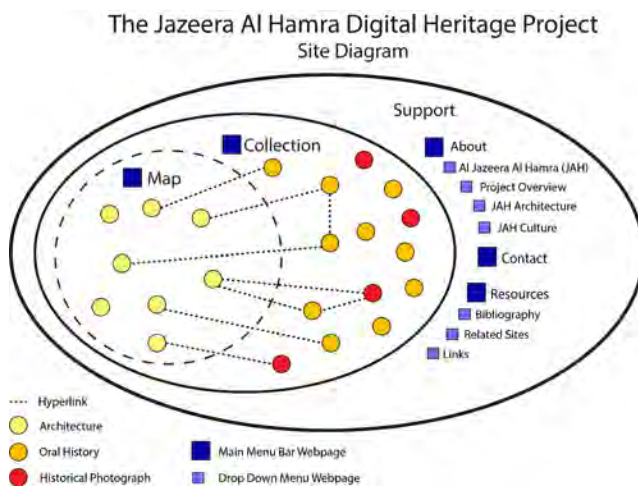


Fig. 7. Illustration by the Author. © Seth Thompson.

Materials to be collected and presented are divided into three different categories:

- Architectural Documentation (360-degree vr panoramas, floor plans and photographs)
- Oral Histories (text-based summaries and/or videos)
- Historical Photographs

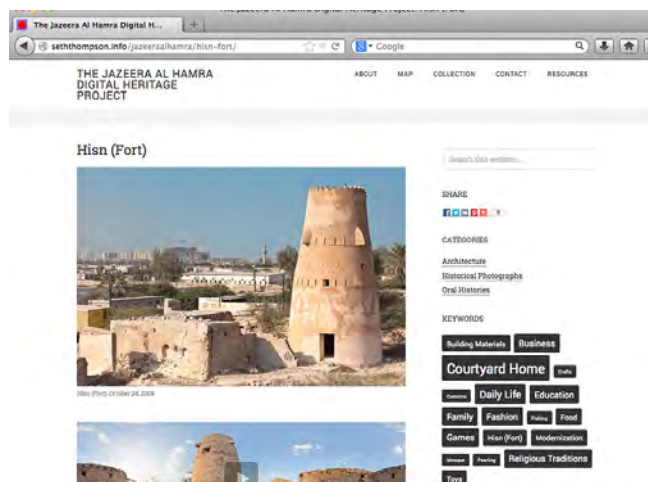


Fig. 8. Screenshot of *The Jazeera Al Hamra Digital Heritage Project*. Photograph © Seth Thompson.

Oral histories are not only integral to understanding how people lived within the village, but where different families resided and who worked in and managed different shops and trades. The collection of oral histories and documentation of the physical site work in tandem with each other as the knowledge base of the project continues to grow. The documentation of the architecture using 360-degree vr panoramas and photographs and the historical photographs provide context to the oral histories and a visual understanding of the place. The categories and keywords are available on most of the webpages for quick searches. Keywords such as: *building materials*, *courtyard homes*, *fishing*, etc., are the

same words used in the website texts (e.g. oral histories and architectural descriptions) that are easy to access for research and informational purposes.

With the inclusion of documentation (360-degree vr panoramas and photography along with descriptive text) of other heritage sites within the UAE and other countries within the region, comparisons and contrasts can be made to provide a stronger understanding of the uniqueness of its material culture in relation to its counterparts. By using digital technologies to document and create records of Al Jazeera Al Hamra's intangible and tangible cultural heritage assets as well as related contextual information, *The Jazeera Al Hamra Digital Heritage Project* not only preserves an important historical site, but it can also potentially be a long-term working experiment in preserving heritage digitally – experimenting with new technologies and ideas that better tell the collective history of Al Jazeera Al Hamra.

It should be noted that this “virtual museum” project model uses accessible and relatively low-cost technologies such as WordPress so that communities may take an initiative in digitally preserving and exhibiting their heritage, whether it resides as an online exhibition within a museum context or exists as its own “virtual museum” entity. The primary benefits of using WordPress as a content management system is that it is (1) customizable and expandable, (2) easy to use after the configuration and design have been completed, (3) upgradable without affecting existing content and (4) relatively inexpensive to run and to maintain.



Fig. 9. *Market (Souq)*, 2010. Photograph © Seth Thompson.

LONG-TERM SUSTAINABILITY OF THE PROJECT'S INFRASTRUCTURE AND MEDIA OBJECTS

Preserving cultural heritage digitally still presents many roadblocks as file formats, hardware and software are constantly evolving. What is considered industry standard today may be obsolete tomorrow. In order to insure the longevity of the project's digital assets, sustainability issues need to be addressed, especially in regard to migrating files to future storage and access systems so that the media objects (digital objects) retain their integrity. In 2003, UNESCO adopted a Charter on the Preservation of Digital Heritage in response to the understanding that “digital heritage is at risk of being lost and that its preservation for the benefit of present and future generations is an urgent issue of worldwide concern[...] [and] [...] that the disappearance of

heritage in whatever form constitutes an impoverishment of the heritage of all nations.” [17] The strength of this charter is that it recognizes the fragility of cultural products existing within the digital environment, which can easily become obsolete or extinct unless appropriate preservation and conservation actions are taken. As hardware and software evolves and with industry standard file formats changing and/or becoming obsolete, precautions and measures need to be taken to safeguard these types of digital cultural heritage projects for future generations in regard to both its content and its value to the history of media arts.

Digital preservation is defined as the “formal endeavor to ensure that digital information of continuing value remains accessible and usable.” [18] For those who wish to use this model for long-term heritage preservation, there are two primary issues to take into consideration: (1) the content management system and (2) the digital assets (e.g., media objects such as the images, text, videos and panoramas). The benefit of using WordPress is that as of 2012, there are more than 60 million websites that are being powered by this free and open source content management system (CMS), which provides automatic upgrades. [19] As a result, this CMS has a potentially long life as the World Wide Web evolves. Nevertheless, a site map and flow chart are important tools for this type of web-based project in order to more easily consider future expansion possibilities as well as the prospect of migrating content to another CMS when a more sophisticated CMS is required or the existing one becomes obsolete. It should be noted that there are currently other open source and free CMS systems specifically designed for exhibition purposes, such as Omeka (<http://omeka.org/>). However, WordPress was chosen to power this model, as there are many more WordPress developers available to help a community or smaller museum set up this type of project.

In regard to the digital assets, which are the basis of the collection, a cataloging system or document management system should be developed for the longevity of the media objects and the long-term sustainability of the project. To best understand the requirements for the cataloging system or document management system as well as the type of CMS to be used, a digital preservation policy needs to be established. A digital preservation policy specifies goals that help ensure that the digital objects remain renderable or executable, the physical media are cared for and that the digital content can be identified and retrieved in the future. [20]

Metadata, which is data about data, is an important component of digital preservation. For the well-being and longevity of digital assets, different types of metadata groupings are necessary, which usually fall under the following four categories: *descriptive, structural, technical and administrative data*. Each category provides necessary information for the conservation of the digital asset. *Descriptive metadata* provides content information (e.g., title, author, subjects, keywords, publisher) used to identify,

search and locate the media object. *Structural metadata* describes the physical and/or logical structure of a media object and how its components are organized. *Technical metadata* provides the technical information on the media object, such as software and hardware on which it can be rendered and executed and specific object information such as image width or audio length. Lastly, *administrative metadata* provides information regarding provenance, preservation actions and rights and permission information. [21]

In addition, a unified vocabulary needs to be established to describe the digital assets so that there is a consistency throughout the project’s digital assets metadata. As a result, the metadata, which provides information about a digital object, needs to be carefully considered. Using a controlled vocabulary and thesaurus – suggested by *Cataloging Cultural Objects: A Guide to Describing Cultural Works and Their Images*, which is a data content standard for the cultural heritage community – would enable the project to potentially improve the discovery and access of the project’s assets, allow for better migration to future storage and access systems and create sharable metadata among other institutions by engaging in a “best practice” currently accepted by other institutions. [22] The field of digital preservation is still in its infancy and there is no definitive approach to preserving our digital heritage – only recommendations and models at this point in time. However, having a digital preservation policy for one’s project is better than having no policy at all, as it helps to have a systematic approach on how the project and its media objects will be communicated, maintained and conserved.



Fig. 10. 360-degree Panorama of a Courtyard House, 2009.
Photograph © Seth Thompson.

CONCLUDING REMARKS

While the model presented in this paper provides a relatively low-cost and intuitive vehicle that supports contemporary museum thought on collective memory strategies, inclusivity and equity of tangible and intangible culture heritage, future research efforts by this author need to be undertaken in order to further develop this model, such as developing a more sophisticated map interface that better interrelates with the project’s media objects and researching and developing digital preservation “best practices” for panoramic imaging. These initiatives play a central role in this author’s vision for future iterations of this model and other potential digital heritage projects.

As inferred from this essay, cultural heritage is much more than material objects and architecture; it is about making sense of our past and developing a sense of understanding through our

collective histories using both tangible remains and lived traces. With a collective approach to knowledge acquisition, a scholar, a former inhabitant or relative and/or a visitor can contribute to a greater understanding of a place by sharing images, stories and research. From the communities located on the coasts of the Arabian Peninsula to the coastal islands of the United States and everywhere in between, the model presented in this paper can reside in a number of different community-based initiatives. By creating a networked vehicle for information collection, dissemination and re-interpretation that enables the tangible and intangible cultural heritage to live side by side with interrelated information, this digital model can provide an infrastructure for the understanding and preservation of a place.

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GENRESIS – TRENDS AND TRAJECTORIES WITHIN THE ART/SCIENCE GENRE

Peter Anders, ISEA International, Michigan, USA

This panel, conducted at ISEA2014 at Zayed University, Dubai, addressed the influence of scientific developments on art and the emergence of themes within the Art/Science genre. The panelists invited were prominent authors, practitioners and leaders in the Art/Science genre. The panelists responded to a brief, which has been excerpted below:

Recent work presented at Ars Electronica, SIGGRAPH and ISEA propose integrations of art with life-sciences and nanotechnology. Much of this would not be possible without the scientific advances preceding them. In fact, the resulting artwork often critiques the very technology used in their realization. But to what degree does technology determine the emergence of Art/Science themes and movements? Where does art set the precedent? ISEA2010 featured presentations by two major figures in Art/Science research, Roy Ascott and Peter Weibel. Both acknowledged the advance of technology and, particularly, developments in brain research. Weibel proposed that artists might create a non-sensory art generated by electronic brain stimulation. Separately Ascott has long promoted arts/technology/consciousness research and suggested that art can lead the way where science cannot.

The years since have seen considerable developments in the fields of neuroscience and cognitive research. In 2013 the USA's Obama administration announced the creation of the BRAIN Initiative – Brain Research through Advancing Innovative Neurotechnologies. With an initial funding of \$100 million the program aims to use emerging technologies to record signals from vast numbers of brain cells and even from entire sections of the brain. This reflects other large neuroscience ventures elsewhere. The European Union's *Human Brain Project* intends to create a computer simulation of the entire brain, drawing a budget of \$1.6 billion over a ten-year period. China, Japan and Israel have similarly ambitious neuroscience projects. In a recent article in *Scientific American* neuroscientist Rafael Yuste and geneticist George Church write, "The global consensus that is now propelling investment in brain science recalls other postwar science and technology initiatives focused on pressing national priorities [...] The Century of the Brain is now upon us."

Among current tools for this research are electroencephalography (EEG), functional Magnetic Resonance Imaging (fMRI), emerging nanotechnologies and optical techniques – such as Optogenetics and Optochemistry – that employ light signals to detect patterns in neural firing. The tools used for sensing neural signals can also be used to stimulate the brain discretely. Researchers have employed Optogenetics to "implant" false memories into mice.

If we relate memory to experience and being, then the creation of memories could conceivably lead to a disembodied art form as

Weibel suggests. When science leaves consideration of the material world to address emotion, identity and mind it has indeed entered on ground long held by the arts. Here science could learn from art just as art learns from science.

This reciprocity opens up many questions about Art/Science sub-genres: How do they emerge? To what degree do they depend on technique, cultural influence or precedent? When are genres defined: by assertion (manifestos), prediction (technological determinism) or when they are recognized in retrospect? What are successful models for collaborations between artists and scientists? How can they negotiate the different processes and methodologies of the disciplines involved? Where are art/sci projects positioned in relation to the mainstream art world?

Peter Anders wrote the brief and moderated the panel. In order of their presentation the panelists included Christiane Paul, Brandon Ballengée, Oron Catts and Paul Thomas. Christiane Paul is an Associate Professor at the School of Media Studies, The New School and Adjunct Curator of New Media Arts at the Whitney Museum of American Art in New York. She is a curator and historian who has written extensively on new media arts. Brandon Ballengée is a Professor at the School of Visual Arts in New York and Visiting Scientist at McGill University. He is an artist, biologist and environmental activist, who creates trans-disciplinary artworks – sometimes referred to as Eco-Art – inspired by his ecological field and laboratory research. Oron Catts is the Director of *SymbioticA* - The Centre of Excellence in Biological Arts, School of Anatomy, Physiology and Human Biology at The University of Western Australia in Perth. He is an artist, researcher and curator whose pioneering work with the *Tissue Culture and Art Project*, which he established in 1996, is considered a leading biological art – or Bio-Art – project. Finally, Paul Thomas is an Associate Professor and Program Director of Fine Art at the College of Fine Art, University of New South Wales in Australia. He is an artist and author of the recent book, *Nanoart: The immateriality of art*, which describes innovations in nanotechnology and their application in the arts.

The panelists gave their presentations in person, via the internet and pre-recorded videos. Each spoke for roughly ten minutes and a lively exchange with the audience ensued. Regarding the role biology plays in contemporary art, audience member Diana Domingues observed that art is in fact already an integration of life on many levels. Concerning the challenge posed by the brief Christiane Paul suggested that in fact there may not be a competition between science and art per se. Since art is as imbedded in culture as science, it may be that the two will naturally reflect one another. Audience member Christa Sommerer agreed observing that artists increasingly use scientific methodology in

their research. So it may not be the topic – biology, ecology, neuroscience – that matters so much as changes in artistic practice itself.

The following statements synopsise the panelists' contribution to the Genres panel.

CHRISTIANE PAUL

A Need for Comprehensive Studies

The evolution of digital technologies, information access, education and social needs, as well as "new media" art since the mid-twentieth century has also brought about a resurgence of interest in art/science (sci-art) collaborations and practice. Art and science intersections and collaborations in fact have a long history spanning centuries. Leonardo da Vinci is often used as the token example in this context, but the story of art and science goes back to cave paintings and artists have explored intersections with science throughout the centuries.

What is missing from the field is a more comprehensive history of trends and trajectories within the art/science genre. This white paper is a call for a more in-depth investigation of these trajectories in the following areas:

1. Histories of Art-Science Practice and its Relationship to the Art World
2. Methodologies & Processes
3. Genres
4. Funding & Support
5. Labs
6. Initiatives
7. Research and Publications

Definitions and Taxonomies

A more comprehensive study needs to make distinctions between roles played by artists and scientists in art-sci practice. Digital / new media art practice by nature implies a fusion art and technology, but one needs to differentiate when it comes to constellations: some artists are "technologists," implementing the technical aspects of their work; other artists are working with technologists who are hired to implement and develop technical aspects of the artists' work. These configurations are different from actual art-science collaborations in which artists and scientists are working on an equal level exploring and fusing the practices in their respective fields.

HISTORIES

1. While there are accounts of art-sci practice in new media, the history of collaborations throughout centuries of artistic practice still needs to be told.
2. The history of corporate support and involvement in art and technology practice at labs such as IBM, Bell Labs and Xerox PARC has received attention, but a more in-depth study of their endeavors and output would be helpful in evaluating the field.

3. Also important would be an account of the relationship between art-science practice and the art world and a comprehensive exhibition history (e.g. the 1986 Venice Biennale was devoted to art and science; exhibitions such as L'Art Biotech, curated by Jens Hauser, at the National Center for Contemporary Arts in Nantes, 2003, are an example of introducing art/science practice to the mainstream art world; a festival such as AxS in Pasadena, CA offers a different type of model for showcasing art and science.)

METHODOLOGIES & PROCESSES

Issues to be explored include: models for collaborations between artists and scientists; methodologies for negotiating the different processes and methodologies of the disciplines involved.

Benefits:

The digital age has the potential to bridge various gaps between art and science. Artistic and scientific technologies of representation both reflect and structure the awareness of the culture in which we are embedded. In the digital age, the technologies of representation as well as concepts in art and science are constantly converging (e.g. mapping of data sets, issues of representation and simulation).

Challenges:

While science – according to its traditional definition – is based on validation of findings, proof and objectivity, art supposedly belongs into the realm of the non-scientific, of speculation, subjectivity, sensual/emotional experience and a freedom of expression beyond accuracy. Stereotypes in art and science need to be overcome to create a fruitful dialogue.

GENRES

Art-science practice has diversified over the decades and a study of the diversity of practices would be crucial. The field of bio-art alone today includes practices such as:

1. genetic art:
 - transgenics (internalization of synthetic chromosomes)
 - synthesis of artificially produced DNA sequences (as continuation of Mendelian cross breeding of animals and plants)
2. cell and tissue cultures
3. bio-robotics
4. bio-informatics
5. neurophysiology
6. biotechnological and medical self-experimentation

FUNDING & SUPPORT (US)

Another important step in researching art / science collaborations would be an assessment of funding bodies and strategies. The NSF, NIH, DARPA, NEA and other federal agencies and private foundations are now increasingly interested in understanding and funding art/science projects. Trans-disciplinary programs are active in most research universities and recently, STEM (science, technology, engineering and mathematics) education initiatives began to add an A: full STEAM ahead. (Gabriel Harp created a

graph showing the history of grants for projects and programs with art as a strategic focus: <http://www.genocarta.com/?p=1139>). The NSF-sponsored SEAD Network (Sciences, Engineering, Arts and Design) is a community of advocates who believe that a competitive edge in economic, educational and social wellbeing relies on transformative efforts that span disciplines and domains. SEAD has held conferences (co-hosted by the Smithsonian Institution with some sponsorship by the National Endowment for the Arts) and has drafted white papers.

LABS

Study of the mission, methodologies, outcomes of labs such as

- Nature and Technology Lab (School of Visual Arts, NYC)
- *SymbioticA* (University of Western Australia)
- Art+Science Center and Lab (UCLA)
- ail (artists in labs) (collaboration between the Zurich University of the Arts, ZHdK; Institute for Cultural Studies in the Arts, ICS; and the Federal Office for Culture, FOC)

INITIATIVES

Study of the mission, methodologies, outcomes of initiatives such as

- ASCI (art & Science Collaborations Inc.)
- SARC (Scientists/Artists Research Collaborations) at the Santa-Fe based 1st-Mile Institute
- SYNERGY - affiliation with Massachusetts Institute of Technology (MIT) and Woods Hole Oceanographic Institution (WHOI)
- SETI Institute Artist in Residence Center
- ART+BIO Collaborative - non-profit organization, affiliated with MassArt Boston)

RESEARCH AND PUBLICATIONS

Bibliography of research and publications such as Leonardo (MIT Press) and SciArt in America (New York).

BRANDON BALLENGÉE

Ecological Understanding through Trans-disciplinary Art and Participatory Biology

Today's environmental issues are often complex and large-scale. Finding effective strategies that encourage public awareness and stewardship is paramount for long-term conservation of species and ecosystems. Artists and biologists tend to stay confined within their professional boundaries, their discourses largely inaccessible to larger audiences. I will propose arguments for a combined approach, which disseminates knowledge about ecology to non-specialists through novel art-science participatory research and exhibitions. Historically scientists have used creative art forms to disseminate scientific insights to a larger populace of non-specialists. Such strategies as compelling texts and visually provocative artworks may still be effective in captivating contemporary audiences. In addition such historic hybrid science-art practitioners may have laid a conceptual terrain

for some of today's trans-disciplinary art and citizen science practices. Seminal ecological artworks from the 20th Century by Joseph Beuys, Patricia Johanson and Hans Haacke employed novel strategies to reach audiences with a message of conservation, blurring boundaries between art, ecology and activism. More recently artists like Cornelia Hesse-Honegger, Helen and Newton Harrison and others have integrated biological research into their art practices, which in turn resulted in new scientific discoveries. Through my own trans-disciplinary artwork concerning frogs, data suggests that the visual strategies I employ effectively increased non-specialist understanding of the ecological phenomenon of amphibian declines and deformations.

In addition evidence from my participatory biology programs, Public Bio-Art Laboratories and Eco-Actions, suggests that non-specialists can achieve an increased awareness of the challenges now faced by amphibians and their ecosystems. Likewise, through participatory citizen science research new scientific insights were achieved regarding proximate causes for deformities in anuran amphibians at select localities in middle England and Quebec. Here laboratory and field evidence, generated with the aid of public volunteers, found that non-lethal predatory injury to tadpoles from odonate nymphs and some fishes resulted in permanent limb deformities in post-metamorphic anurans. From an environmental-education and larger conservation standpoint, these findings are very relevant as they offer novel strategies for engaging non-specialist audiences while generating important insights into biological communities and wetland ecosystems.

ORON CATTS

Why Artists Seriously Play With Life?

Humans' relationship with the idea of life is going through some radical shifts; from the sub-molecular to the planetary. The cultural understanding of what life is and what we are doing to it lags behind the actualities of scientific and engineering processes. From Synthetic Biology and Regenerative Medicine, through Neuro-engineering and Soft Robots to Geo-engineering, life becomes a technology, a raw material waiting to be engineered. This provides a new pallet for artistic expression in which life is both the subject and object. In the fields of science and engineering, radical approaches to life – driven by mindsets of control – seem to be taken haphazardly. This exposes unintentional ontological breaches and reveals an urgent need for cultural, artistic scrutiny of life. This scrutiny is beyond human speculation and through direct and experiential engagement.

Artists dealing with the theory, practice, application and implications of the life sciences help create a platform that actively pursues different directions in which knowledge and technology can be applied. This can be seen as cultural scrutiny in action, articulating and subverting the ever-changing relations with life. Much of the work of biological artists seems to be transgressive, trespassing into areas where "art should not go." Yet it often does little more than culturally frame the manipulations

of life that have become commonplace in the scientific laboratory. This aesthetically driven and confrontational treatment of life by artists can create an uneasy feeling about the levels of manipulation applied to living systems. This uneasiness seems to stem from current values and belief systems that seem ill-prepared for the consequences of applied knowledge in the life sciences. Life is going through a major transformation, even if it seems more perceptual than actual. Through rigorous, critical and indeed wondrous explorations in the life science laboratory, the artists begin a dialogue, engaging with the extraordinary potentials and pitfalls of our new approaches to life.

SymbioticA is recognized as the first artistic laboratory dedicated to providing artists with support for this kind of research within an institutional setting. It is acknowledged as a benchmark for similar labs. The laboratory was established in 2000 within the School of Anatomy, Physiology and Human Biology at The University of Western Australia. *SymbioticA* specializes in Biological Arts, developing programs such as artistic research residencies, workshops, academic courses and public engagement through exhibitions and public presentations. To date, *SymbioticA* had more than eighty artist-researchers that were mentored to develop skills and make use of scientific techniques in manipulating life forms. Some examples of past residents are ORLAN, Critical Art Ensemble, Kira O'Reilly, Chris Salter, Peta Clancy and Helen Pynor. Through their hands-on experience, these artists become deeply engrossed in scientific methodologies and technologies. As a consequence, their projects may intentionally provoke, expose hypocrisies, meditate upon and question the limits of 'what is acceptable' by current societal standards.

Being based within a research university, *SymbioticA* needs to adhere to regulations concerning ethical conduct and health and safety. In most cases our research is scrutinized much more strictly than our scientific colleagues' work. A common criticism of the work undertaken by artists in residence is that this type of artistic involvement with life is frivolous and in some cases "shocking." The apparent lack of utilitarian value seems to trigger such reactions but at the same time it does what art does best – create awareness and allows critical engagement that destabilizes perceived assumptions and challenge perceptions.

PAUL THOMAS

Materiality and the Evolution of Graphite

This paper explores the speculative nature of the quantum universe. Marcel Duchamp in 1913, eight years after Einstein's theory of relativity and fourteen years before Werner Heisenberg's Uncertainty Principle, demonstrated poetically the problem of measurement in his work *Three Standard Stoppages*. To explain this problem of measurement in quantum mechanics I refer to Karen Barad: On the face of it, these questions seem vacuous, but there may be more here than meets the eye. Consider, first, setting up the condition for the experiment: we begin with a vacuum. Now, if a vacuum is the absence of everything, of all

matter, how can we be sure that we have nothing at hand? We'll need to do a measurement to confirm this. We could shine a flashlight on the vacuum or use some other probe, but that would introduce at least one photon (quantum of light) onto the scene, thereby destroying the very conditions we seek. Like turning up the light to see the darkness, this situation is reminiscent of the mutually exclusive conditions of im/possibility that are at issue in Niels Bohr's interpretation of quantum physics. [1]

This paper will describe the historical moment of new materiality in which we live by examining the humble graphite pencil and the implications inherent in the discovery of graphene. To explore this moment we examine the tool of the pencil and its medium graphite to provoke discussion on our understanding of the material world and our relation to it. To draw with a pencil is shape one's thought spatially and diagrammatically in ways no other medium can express. Drawing helps us to render, comprehend and make sense of the structures and laws that bind our world. The art of drawing, then, is a discursive act in which the pencil mediates thought, capturing reality in the act of happening. The major focus of this paper is the development of graphene in 2004, which – prior to this time – was purely theoretical, a single sheet of carbon atoms. The process through which this material was extracted was a simple laboratory experiment: using scotch tape to whittle down graphite to a single sheet of graphene. There are a many assumptions that one can draw upon when looking at a pencil, but it is at a moment in 2004 when these assumptions were tested and new territories appeared on the horizon. Now the pencil's constituent, graphene, has taken on surreal new forms that were inconceivable prior to 2004. We need to be aware of the pencil's genealogy. It will be people such as you who will demonstrate how the discovery in 2004 brings the material's agency into new territories.

Graphite for pencils came to being around 1500 when large rare deposits were discovered at Barrowdale in the UK. The pencil with a wooden sleeve, developed in 1560, gave impermanency to the mark for artists and writers. It was used to make the imperceptible real, to communicate ideas. The material graphite/graphene now takes on a new role in communication technologies, nanotubes, quantum computers. The Graphene Moment is evidenced by what would appear to be historically ridiculous concepts, now made real. The transformation of this material calls for the reevaluation of graphite's capabilities. Questions related to an artistic interpretation of the world via graphite now challenge the quantitative approach of science. The discovery of graphene enables us to explore new material developments and research within the domain of drawing. The articulation and mapping of understanding establish graphite and the pencil at a focal point in time. Richard Feynman's pencil diagrams, graphene, nanotubes and the mechanic atomic force microscope (AFM) contribute to an analogous history of drawing. Science and technological research via the AFM's pencil-like probe is of particular interest here.

AFM

A fundamental change in our understanding of materiality has evolved through a quantifiable 'machinic' comprehension of the world. The instruments of nanotechnology change the visualization of matter. We now see a world made visible by tools of nanotechnology such as the Scanning Tunneling Microscope (STM) in 1981 and the later Atomic Force Microscope (AFM) in 1986. The AFM is one of the foremost tools for imaging, measuring and manipulating matter. Gathering scientific data through touch challenges a dominant ocular-centric understanding of the world. The AFM and nano-assembly allow us to move atoms and create new materials, forms and structures. They replicate the biblical construction of humans from dust particles.

The discovery of graphene makes us rethink the way we view the world and, therefore, the way we represent the world. Graphene, which is the name for a single atomic sheet of graphite (a pure form of Carbon), is an excellent conductor of electricity and is fit for various mechanical purposes. Since its discovery in 2004 graphene, 200 times stronger than steel, has been applied to many new purposes – from the construction of next-generation transistors to light-weight, high-strength composite materials, from flexible television screens to quantum computing. Graphite is being explored across many university research centers. Of these the Centre for Quantum Computation (CQC) at the University of Oxford, led by Dr. Simon Benjamin in the area of Molecular & Solid-State, is of particular note.

Thus, one possible building block of the quantum computer is the buckyball C60. The C60 molecules have individual nitrogen atoms fired at them that become trapped inside the buckyball, creating nC60 molecule, which is at the very core of a microprocessor's array. The caged nitrogen atom within the buckyball is incarcerated and isolated but still has the ability to spin and can be controlled by microwaves to emulate the zeros (by spinning up) and ones (by spinning down) of the digital computer's binary code. However, quantum computing explores the potential of the nitrogen atom's superposition inside the buckyball to be in more than one state (not zero or one) at the same time. [2]

We now face the implications that the discovery of graphene has on the medium of drawing. A range of contemporary artists has taken up a revised approach to the materiality of graphite. This shift in the potential or perceived agency of the material of graphite has opened up a rich new environment for creativity and inter-disciplinarity.

The Art of Graphite

The challenge to our understanding of materiality of graphene is played out in Victoria Vesna's and James Gimzewski's 2002 artwork, *ZeroWave Functions*. The work takes the viewer inside the imaginary, enabling them to draw and shape molecules with their own shadows. The exploration of graphene will be put to use in Benjamin's quantum computing research and demonstrates

the development of immaterial relationships while engaging in the possibilities of thinking particles. The user inadvertently draws the buckyball across the surface and engages with it through the gesture of transferring meaning through the act of mark-making. The interaction with the C60 molecule suggests complex relationships with matter, playfully controlled by the viewer. At the same time it opens up questions of manipulation – even colonization – of the material world. The revelation of graphene has great consequences for the practice and epistemology of drawing. The art historical importance of the emergence of graphite is in the how, why and what of radical reinvigoration of the medium. The human body's major ingredients, Carbon (18%) and Oxygen (65%), draw interesting parallels with the pencil and suggest shared alchemical genealogy. What could we make of the relationship between chemical components of material graphite and that of the human body? Do we start to see these attributes as being causal, intrinsically linked to being human? What are the connections between a conscious state for matter when applied to a material that makes the invisible world visible? Synergies converge around thinking as being atomic: the use of carbon atoms in the processing power of the quantum computer; the potential of graphene as a telecommunication tool. These speculations demand rethinking the marks we have made. The ability of the material to express human thought is much more powerful than we could have initially imagined. Graphite may now serve not only to record and map thoughts but now inscribe a range of non-semiotic utilities, such as its aptitude as conductor of electromagnetic currents.

The transforming agency of graphite and the definition for new modalities of drawing are central to graphene as a material in the production of contemporary monitors and touch screens are of great significance. The confluent material agency of graphite as tool for visualizing the world both physically and, now, digitally announces a new kind of drawing. The same material that has historically been used by artists is now central to mainstream digital media of communication today. The reestablishment of touch as the sense connecting us directly with the material world is implicit in our transmissions through the pencil to the surface of the paper. As though the old gramophone needle that draws out the undulations of the record and translate it into sound could by a similar process of reengineering of information exhumed from the pencil marks. The inauguration of graphene has prompted the need for revisionary history and reconceptualization of graphite drawing. These new interpretations of old materials show the need to expand sensory awareness of our surroundings, how we interrelate and interact in it.

We have covered the relationship between graphite and graphene to discover something about the 'agential' relationship that is applied to materials. Once we perceive what was at first invisible and also inconceivable, the complex understandings of our material world shift. We comprehend that thinking and thoughts are atomic and stem from an intuitive understanding of rationalizing

nothing. In other words, if nothing cannot exist and everything is something and the smallest individual part is atomic and as thoughts are something they must also be atomic. The writings of the Epicurean Lucretius in his poem '*On the Nature of Things*' led to the swerve as being at the heart of all classical matter. The swerve and or spin of the photon, electron and nucleus are also at the heart of quantum computing placing the genealogy of thought as thought itself. Thinking the world into existence becomes part of the process as humanity attempts to understand the universe and our role within it. Thinking machines generated by the same atoms as their creators demonstrate what we already intuitively understand.

How can art express in a new voice, a new language that creates an awareness of its role in the development and influence of thinking about the nature of our world? The discovery of graphene shows us that this is not the only way to think of nature. Gavin Parkinson situates this argument historically and culturally with reference to surrealists in the 1930's where he discusses "the peculiar difficulties faced by artists in finding a language for the 'new reality' revealed by the physicists and argues that the relocation of Surrealism in a discursive field which includes quantum physics discloses the rationale behind its artists' shift to a semi-abstract language." [3] This statement reveals a link with the illuminations gained from probing and constructing realities in the same moment that science is exploring its constructed realities, drawing out synergies in the age of art, science and technology.

The Euclidian gaze of a measured universe where that viewpoint puts each individual at its very center creates the schism that can't be breeched by new terminologies. The shift that needs to take place follows on from a pursuit of 20th century art in reconfiguring the perspectival gaze. It allows us to re-connect, to become part of the material world, not merely voyeurs. This cannot be stressed enough in terms of sensing space. Thinking of pre-perspectival space as a garment that one wears changes our understanding of what our relationship with the material world can be.

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RESPONSIVE ENVIRONMENTS: A PANEL ON THE INTERRELATION BETWEEN LOCATION, ATMOSPHERE AND DIGITAL MEDIA

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ABSTRACT

Since the emergence of computer technologies the notion of "location" has been expanded. From the beginning, digital media were seen as world-generating technologies able to create alternative forms of "locations," e.g. virtual environments. Currently, tendencies like ubiquitous computing and wearable computing point to a further dimension of "location:" hybrid spaces in which moving, multi-sensing and interacting may reach new levels of intensity. This causes a paradigm shift in digital technologies, because the simulation of virtual spaces is substituted by experiments with interaction and digitally expanded perception in physical space. Thus, mobile and pervasive technologies will change the future design and artistic opportunities of Human-Computer-Interfaces. Furthermore, their extended responsiveness will modify the individual's perception and notion of the self.

The panel discussed different artistic approaches to hybrid spaces and the notion of "location." Central for this range of topics dealing with the implications of technology driven spaces is the notion of "atmosphere" in its threefold sense: as physical atmosphere (the air we breathe), as social atmosphere (the way we interact) and as media-generated atmosphere resulting from an intended design of environments.

THEORETICAL STARTING POINT: THE THREE DIMENSIONS OF ATMOSPHERE

The theoretical starting point of the panel was the idea to investigate a phenomenon that has a decisive impact on our lives, but that cannot be described with the traditional analytical instruments: 'atmosphere.' 'Atmosphere' comprises three different dimensions: a) the geophysical atmosphere that is crucial for our survival on Earth; b) the social atmosphere between people in different contexts (e.g. groups organizations, nations and global communities). And finally, there are c) media atmospheres that are willingly produced – in art, through mass media, but also in urban planning and daily consumption-oriented surroundings (shopping malls, wellness environments, etc.). In most cases, social and media atmospheres will be deeply intertwined, because there is no interaction without media and vice versa.

Apart from geophysical atmosphere, atmospheres have never been subject to scientific research because they transcend the traditional categorizations that social sciences and humanities work with: First of all, they lie between subject and object, because in the social context everyone is simultaneously producer of an atmosphere (subject) and perceiver of it (object) – thus experiencing atmospheres also transcends the traditional observation role of the researcher. Furthermore, atmospheres are 'sensed' – they are perceivable, but in a way that lies beyond traditional epistemological

models of intellectual insight. To sense atmospheres implies intersensorial perception in oscillation with intellectual insight, with pre- and unconscious processes, which are closely related to emotion – this complexity needs to be investigated. Finally, atmospheres affect modes of activity, as can be observed in such different fields as economy and politics alike. Therefore, action theory also needs to consider such diffuse phenomena as atmospheres to be able to explain complex activities, not only of people, but also of institutions and even governments.

These fields where 'atmosphere' is of relevance are also concerned with the fact that all three types of 'atmosphere' are not static objects that only react when being acted upon, but all of them have a unpredictable potential to change and to develop significant influence on the way people, societies and (globalized) communities act. Thus, atmospheres develop operation modes that have to be investigated from the different angles of the fields just mentioned.

TECHNOLOGY, LOCATION AND ATMOSPHERE

The theoretical notion of atmosphere, which is shaped by philosophers mainly coming from phenomenology (like Hermann Schmitz und Gernot Böhme in Germany, Brian Massumi and Mark B. N. Hansen in the US), is inherently bound to physical space and presence. It relies on a sort of "immediate" sensing that obviously changes according to the specific mediality of the environments in question, which can be concrete physical locations or virtual spaces being formed by processes of interaction and interactivity or by hybrid constructions of both. The panel therefore intended to broaden the perspectives on atmosphere and location in considering the impact of technologies like ubiquitous computing and sensor technologies (e.g. biofeedback) on our notion of location and on the consequences for emerging atmospheres which are technologically driven but nevertheless are experienced in an 'immediate' way.

The presentations given in this panel address different aspects of the experience of technical environments and discussed especially the following questions:

- What are the characteristics of hybrid spaces and how can they intuitively be experienced despite the use of high tech applications? And what kind of technologies, artistic expressions, design principles and dramaturgic strategies are adequate to reach this level of intuitive and immediate experience in concrete locations?
- What is the role of multisensory design in this context? Do we need to transcend the audiovisual sphere and include kinesthetic, olfactory and tactile experiences to create an

immediate atmospheric experience? And what are the consequences for human proprioception when sensor-based technologies like biofeedback establish an 'immediate' relation of the human to the environment, which is mainly based on somatic processes (like heartbeat and breath) and which can only partly be intentionally influenced?

- How can scientific qualitative and quantitative data be interpreted and designed aesthetically without being treated in a complete arbitrary way? This question leads directly into the center of the discussion on the relation between art and scientific research and the ways of data design (data visualization, data sonification etc.).

THE CONTRIBUTIONS

Scott Hessels introduced a special educational program of the Hong Kong based School of Creative Media. The Extreme Environments program explores how student artists, researchers and scientists working together can collect and interpret environmental data using new forms of creativity and visualization. The students do 'on-site-research' in special locations and have to develop creative ways of multimedia presentations of their research results. By this the physical atmosphere as 'object' of data collection becomes a topic, the media-driven interpretation and presentation of data furthermore creates specific spatial and atmospheric experiences which become part of the student's artistic research process.

Ilze Black investigates a second dimension of atmosphere: the specific social processes that emerge from networked cooperation and considers methods and approaches used during de-located, distributed design processes. She introduces among others the development of *The Breather*, an interactive system based on sensor technologies, air quality data and networked real-time data sharing which again leads to the physical atmosphere as topic of current media technology developments.

Gwenn-Aël Lynn's work deals with another aspect of atmospheric sensing and location: The implications of olfactory sensations for the evocation of specific emotions linked to the question of how cultural identities are created. In two art installations, one of them exhibited at ISEA2014, open source computer vision provides the visitor, whose body is the interface, with an aural and olfactory experience. The fragrances are created on the basis of interviews with expatriates whose identities are manifested through the olfactory and aural associations. Both installations contribute to building a critique of the politics of representation that are rooted in ocular hegemony and emphasize the deep connection between location, multisensory (atmospheric) experience and identity.

Jan Torpus introduced the media art project *Affective Environments*, which intimately involves exhibition visitors by connecting their heartbeat, respiration and skin conductance to three installations. The work explores possibilities of interacting with artificial environments excluding decision-making, thus

establishing an intuitive interconnection. He compared the artwork to the artistic research project the panel chairs currently work on: *Designed immediacy: Atmospheric experience in an affective-responsive environment*. Both works connect biofeedback signals to artistic settings but apply different concepts, strategies and methods. The tension between perception of intrinsic processes and encounters with something unfamiliar gives rise to interesting questions regarding peoples' awareness of their own impact on the respective surroundings and their personal identity.

And finally **James Partaik** introduces Insertio, an artistic initiative, which creates art interventions that actuate urban space and its infrastructures, revealing issues implicit to the site, the technologies themselves in a specific cultural context and the creative actions used to transform public space in a tangible way. The paper presents tactics of occupation and imbrications of urban infrastructures exemplifying Insertio's use of site, devices and art actions that coalesce with the emerging discourses surrounding the issues of art, architecture and urban spaces in the age of the networked landscape.

PANEL DISCUSSION

The discussion which followed the panel contributions made clear that the topic of atmosphere is in all its dimensions extremely relevant for media theory and artistic practice. Under the premises of an increasing attention for environmental topics, projects like the Extreme Environment program in education and the development of applications like *The Breather* which combine art, design and ecology point to the cultural implications of the physical dimension of 'atmosphere.' But the social and medial dimensions are equally relevant and need further attention. This counts for new structures of open-source-production in networked communities as well as for the investigation of atmospheres which emerge from 'interfaceless' technologies and the agencies which evolve in these responsive environments. It was one of the main results of the discussion that further theoretical and methodological work will be necessary. Firstly, scientifically and artistically dealing with atmospheres causes a paradox, as the modes of experience are willingly influenced: The intentional creation of atmospheric spaces might minimize the intuitive and subconscious parts of experience for the humans involved because they know that their perception modes are investigated.

Secondly, dealing with a concept of agencies which includes human and non-human agents demands a methodological approach that transcends the anthropocentric view of qualitative social sciences. This might shed a new light on the search for specific methods of artistic research. How such problems can be adequately approached and investigated in order to grasp their consequences for our concepts of identity and self-perception, will be one of the core questions for art and media studies in the future.

THE AIR QUALITY EGG: THE INTERNET OF THINGS AND COMMUNAL SOCIALITY

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ABSTRACT

This research contributes to the discourse surrounding technological innovation of the *Internet of Things* and, in particular, contributions made by a group of early adopters. The initial motivation for the *Internet of Things* was a fusion of the physical and digital worlds, enabled by a pervasive network connectivity of everything everywhere. However, more recently, the prevailing discussions around the *Internet of Things* have moved and are mostly grounded in a rhetoric of a connected world, future sustainability and improvements brought by deployment of innovative techno-socio-economic-environmental systems: these would not only deliver solutions to humanity's ever growing needs and manage its resources and distributions, but would also lead to a paradigm shift in the very principles governing such systems. This study questions the foundation of such claims and aims to contribute to the critical and phenomenological understanding of the *Internet of Things* and its social spatiality by uncovering embodied, experiential meanings of this phenomenon as it is concretely lived and experienced by a group of open source developers. At the center here is an ethnographic study of relationships between this group of open source developers, a tech start-up and a community of citizen scientists, all involved in a development of Air Quality Network and in particular the Air Quality Egg (<http://airqualityegg.com>) This paper considers methods and approaches used during the design processes and examines contradiction embedded within the discourse.

INTRODUCTION

This paper is a part of ongoing research into the spatial reconfigurations brought about the development of the Internet of Things and its expansion in the second decade of the 21st century. In particular this study focuses on a community of open source developers, artists, architects and computer enthusiasts who were not only curious about the possibilities opened up by this next stage of technological development but also went on to test and re-imagine the use and deployment of this new technological paradigm and its use as commons. As we have argued elsewhere, such testing and re-imagining of what Lefebvre called the *dominant space*, pioneered IoT discussion and development during 2011-2013 in London, Europe and America. [1], [2] Likewise, one of the key interest of our research is also a suggestion that the community we discuss here appropriates the tools of counter-cultures of the past or might be seen as one that uses culture of experimentation to progress its way, thus resonates with earlier avant-gardes such as the Situationists International.

In his recent rethink of the *Internet of Things* phenomenon Bruce Sterling [3] compares its current state with that of 'a Holy Roman Empire full of obscure but powerful leagues and consortia and baronies and dukedoms and even some Free Cities.' If in its turn,

we are using this metaphor as a context, we could suggest that the focus here is on the masons of one such Free City, its rise, its fall and its legacy. This study examines not only how such communities come about and organize themselves but also analyzes the materials they bring to the world and contributions they make to the larger debate of IoT and network commons. The phenomena of such groups or communities, actively testing and re-imagining one or other stage of technological development by shifting its conceptual or technological boundaries, is not unique to IoT. In the past there have been numerous precedents that occurred when certain technologies were released to the public (from the military) or acquired an accessible price (commercial liberation) that allowed creative minds outside those institutions to experiment with DIY methods and search for the technological applications with broader public/shared use. Examples can be found in the past such cases as community explorations and advocacy of public use of WiFi or radio technologies that have been widely discussed at previous ISEAs or similar forums where conversations at the boundary of art and technologies are taking place. [4 - 6]

In this paper we will focus on the AirQualityEgg (AQE), an object (a thing in the IoT) that was developed, tested and produced by one such contemporary community. AQE is a networked object with sensory capacity or a 'logject' if we use the terms already scrutinized by Kitchin and Dodge that not only reads data about its surrounding but also passes it on to the network. [7] At the same time AQE was also meant to be an interface to the very world of data it collect. We will discuss here the methods and design approaches used in the production process as well as its relevance and shortcomings.

ON METHODOLOGY

For a period of two years (2011– 2013) we closely followed a particular group of developers: we will describe it here as a community of practice due its own proclaimed nature of community. Due to its dispersed nature, their encounters with each other had many modalities: we have attended and observed their gatherings on semi-public and public occasions, followed their discussions on the mailing lists and conducted numerous interviews with the group's members. These recorded observations through video, photography and audio, as well as collected screenshots, data records and personal notes, form the core of this ethnographic study.

Appropriating the tools of ethnographic action research, we declared ourselves as participant observers. [8] As Ann Light has argued, this 'activist' type of commitment is a 'necessary part of gaining admittance into the particular world that we wished to study, both ethically and pragmatically.' Likewise, here, not only

to gain the deeper understanding of the workings of this community but also to acquire inside knowledge and know-how of workings of the AQE itself, we became part of the Air Quality Network and its community. Thus, there are also elements of auto-ethnography that have informed our analysis of the subject under scrutiny. [9]

AQE - COMMUNITY DRIVEN DEVELOPMENT

The AQE was, technologically, a networked air quality sensor device. However, as Tom Igoe from Arduino insists, “it’s not about the things, what really matters is the relationships that these things enable.” [10], [11] The AQE, then, was also a core driver of conversation in a vast network of developers interested in sensor technologies, the connected world and the changes such technologies could bring to human life.

The AQE, as many have pointed out, could not exist nor have any impact if separated from the ‘web or networked fabric of Pachube’ or its online data repository. [12] Pachube, founded by the London based architect Usman Haque, is a network platform constructed to accommodate the *Internet of Things*. [13], [14] It was, in its early days, a shared resource used by individuals interested in connected world, techno amateurs and even less technically minded, such as artists and designers. [15] Around 2011 Pachube was acquired by LogMeIn, as a community using it was starting to make waves in what later became the vast ocean of IoT expansion. [16] Acknowledging the role of the community, LogMeIn hired a community manager and invested in community support, mainly by facilitating community gatherings with drinks and canapes and by further provisions of free access and use of the Pachube platform. Pachube was later named Cosm and now is known as Xively. [17]

If we trace the genealogy of AQE, the first publicly recorded mention of it can be found on a New York Sensmakers meetup message board on October 2011 at meetup.com. Ed Burton, the community organizer, marking the success of a very first New York IoT meetup writes: A quick note on the Nanode contest: We ran completely out of time and even missed one speaker. I am figuring out how to handle this and we’ll hear more at the next meetup. If you have an idea for a sensor deployment in the city (Joe Saavedra and I were discussing an air quality sensor deployment), contact me! We have Nanodes! [18]

Another platform is also relevant: meetup.com, a tool for organizing the support of volunteers and activists and for supporting self-organized groups with tools such as photo album, rating system, calendar and discussion board. Weinberg et al. have identified a new type of community occupying this hybrid space. As they suggest: we classify Meetup as an organizing tool for a new type of hybrid structural community. One that is integrated and neither exclusively offline nor exclusively online, which, again, we call an electronic-to-face (e2f) community. [19] These new types of communities, namely those that seemingly appropriate both online and offline space, have become more common and thus more

discussed by social scientists. The discussion is mainly concerned with social capital and importance of weak ties in the formation and sustainability of such communities. For example, Mark Granovetter, who already in 1973 contemplated the role of weak ties and its influence on social formation and creativity explains: Strong ties may provide more emotional support and substantial material support, while weak ties, those who do not know all of the same people, are important sources of novel, non-redundant information such as information about job opportunities. [20]

In a context of IoT meetups and the development of the AQE, meetup.com has been a central tool for the management and sustainability of such weak ties in this on-line and off-line community. And it is this community that plays the key role and we could argue, is the very method used, in the research, development and production of the AQE device (or the product), understanding the data (or information delivered by the device) and sustaining the data network itself in a long run. Thus through the digital footprint left on a walls of IoT meetups (on meetup.com) in New York, Amsterdam, London, Barcelona, Madrid, Chicago we can trace the AQE development discussion and community of people that developed this early example of affordable, sensor empowered, air quality data-gathering product, both sides of the Atlantic. Other traces can be found on community Wiki site and Google Group discussion boards. [21], [22]

AQE DESIGN METHOD: COLLABORATION AND OPEN SOURCE

The affordability, cheapness and simplicity of open hardware such as Arduino boards and open source software has led to a popularity of makers culture and the spread of technological know-how, which both facilitate electronic innovation. [23] As we could read in a message left on a meetup wall, the very first IoT meetup in New York hosted an idea contest for which the prize was not the Arduino board but rather 50 Nanodes. Nanode, just like Arduino is an open source microcontroller board. [24] However, Nanode has on-board Internet connectivity, whereas Arduino used separate Ethernet and microcontroller boards. This small difference made Nanode that much cheaper and an ideal platform for IoT experiments at the time. If until 2011 the focus for many developers was on access and control of an object, with the development of Nanode the focus shifted to networks of controllable objects. Nanode was developed by London Hackspace in 2011, with support of the IoT community. [25]

The other hardware aspects of the AQE are a low cost temperature, humidity, NO₂ and CO₂ sensors. [26] The initial motivation for the *Internet of Things*, as it was for earlier developers of ubiquitous computing, was a fusion of the physical and digital worlds. [27] To understand the physical environment we need to translate it into a digital form: in practice, this means the use of sensor technologies. For a low cost, citizen driven project such as AQE, it was crucial to use off the shelf, affordable sets of sensors. That meant that sensors that were produced for some other, particular

industrial use were adopted for use in the AQE project. This in turn, raised problems with calibration and data accuracy as properties of physical environments differ.

After the initial Sensmakers/IoT meetup in New York, just six days later on October 16th, the next IoT meetup was held in Amsterdam. [28] The first call there was entitled '*Amsterdam is here for you to build.*' The workshop host was Usman Haque who had introduced the *Pachube* concept to the maker community and others in New York. During the workshop, free hardware (mainly distribution of Nanodes and cheap air quality sensors) could be obtained by participating and building data gathering devices. On November 18th the Amsterdam IoT meetup called for the next meetup/workshop. This time it was already entitled '*Breathe, Amsterdam.*' It was followed by '*Air Quality Egg Hack-Day*' on December 17th 2011, during which the first AQE prototype was built.

Overall, there were about three development and a few more testing stages that took place across Amsterdam, New York and London before the project went on to Kickstarter. [29] The final prototype development was led by Joe Saavedra of *citizensensor*. cc. [30] Codes of the prototype and all the following experiments were published on GitHub. [31] The Kickstarter pledge of \$39,000 raised a total of \$144,592 from 927 backers. WickedDevices stepped in to do the production and distribution of AQE kit and again all software is published on GitHub. [32], [33]

AQE – A DATA OBJECT IN A HYBRID SPACE

The final product, the AQE, consists of two parts, which are two egg shaped objects. Sensors are placed in the outside egg that transmits data wirelessly to the network unit, which is set up inside and connected to the Internet via Ethernet. Both boards have LED lights. During the workshops there was much discussion about the LED signals that could signal the air quality to its owner. However, in the final product the LED lights signal only the state of the device itself. Whether it is on or off and whether it is connected to the Internet and transmitting data. However, the LEDs are reprogrammable and so could potentially make air quality readings visible through the changes in LEDs.

It is more a question of data and its localized readings that could make sense within a particular location. The AQE data are uploaded to the Internet; the 650 AQE produced with the Kickstarter funding and all those produced after are preprogrammed to find their way to the Xively platform and deposit their data in a data repository at Xively, without the user entering the Xively space. It is here, in this privatized space, where the owner used to be able see the graphs of incoming data and examine the air pollution levels. There is, however, a new Air Quality Network interface online, which was created at airqualityegg.com. It is here where one now can join the Air Quality Network, register their AQE, monitor its data stream or observe the other AQE data streams. There are about 1054 (as on Oct14, 2014) AQE mapped on this new site. While this site provides a good overview of the network, it lacks ability to

communicate with other AQE owners or an easy way to extract data streams for comparative analysis. To do so one would need to locate the stream on Xively platform and use their API to extract wanted data. That would mean setting up the Xively account, currently only free for developers. [34]

The result of this collective action is AQE, an out of a box solution that enables users to get closer to atmospheric data. The graphs are the current interface to the real-time sensor data or rather raw numbers transmitted by AQE. While discussing the contexts and data interfaces, Lev Manovich distinguishes two types of methods for data visualization – data reduction method and direct visualization or visualization without reduction. [35] Undoubtedly, live sensor data created by AQE counts as the latter.

These distinctions are, however, problematic. Over a period of two years and three platform redesigns, the changes in the graphs have raised numerous questions, as during the programming of these interfaces some reductions have been made already. We can also ask about the concept of "raw data" that is a work here: we need to understand the relationship between the interface and the physical object, such as the AQE and the like, which themselves become interfaces. The smart objects themselves are computerized and as such will contain numerous boundaries both within computer networks, with their software parts and architectures and within the physical world, the atmosphere and us.

There are also questions of data accuracy and data ownership. The data quality offered by the AQE is collectively discussed and a record of it can be found on the AQE wiki space. [36] The statement there states: 'One unique aspect of the Air Quality Egg is our ambition to try to avoid having to calibrate all sensors we ship since it would require substantial effort and access to expensive specialist equipment. Instead we will explore ways of making use of our potentially large network of sensors to compensate for large range of readings from individual sensors.' [37] One of the principles of data calibration that dominates the discussion on the AQE Google Group is the concept of *Blind Calibration*. *Blind Calibration* as discussed by Balzano and Nowak is one way of thinking how to make sense out of raw data read from sensors with no calibrated source. [38] Balzano and Nowak apply the term *Blind Calibration* to 'automatic methods for jointly calibrating sensor networks in the field, without dependence on controlled stimuli or high-fidelity groundtruth data.' [39] They propose an algorithmic solution, a "novel automatic sensor calibration procedure that requires solving a linear system of constraints involving routine sensor measurements."

Other calibration ideas discussed were *scale-free* calibration for which some high-end calibrated sensor utilized by a known source could be applied to compare the data created by an AQE and suggestion of AQE specific sensor sample calibration in a controlled environment that could then provide format for all the rest of AQE network sensors. However, until today there has not

been a network wide calibration attempt and most of the AQE observable on a network uses the sensor factory settings. [40] As AQE data is collected and stored on Xively it is presumed to be open, social and shared. However, Xively is a privatized space thus data security and use relies on the good will of the company. Likewise, data ownership still is a contentious question that evokes larger discussion about ownership of technological resources and nature of the networked space.

CONCLUSION

If we return to the metaphors used by Bruce Sterling we evoked at the beginning of this paper, the social assembled around the Pachube could easily be recognized as a Free City, even if only for a brief period discussed here. [41] As history has shown, most often such small political entities survived only for a short periods before they get incorporated into larger organizations of society, be it empires, nation states or corporations. However, it is the values, ethics and lived experience that convey original ideas of city founders as well as over go the changes in such transition process.

Like utopian visionaries of the last century who interrogated urban conditions brought about by modernity, the advocates of the AQE project believe that it might be a matter of developing a 'new consciousness' and that the 'changes in urban space are linked with changes in urban life and that transformation of one is bound up with other.' [42], [43] By bringing the awareness of atmospheric data and learning to read into the data emitted by abstracted sensor devices, AQE advocates anticipate that, as a result, one day we could change our behavior or at least be informed and make an informed decision and individually or collectively act upon it. Like the Situationists International, they preached that, despite present conditions, the seeds of change are within it and within us and that with the technological engagement and know-how we could create a radically different future. By getting together and developing tools for a working and breathing network, their methods echoed ideas formulated by SI founding fathers Ivan Chatchegov's in his 'Formulary for New Urbanism' and later Constant's ideas of New Babylon in which place would take shape in response to people's actions. [44], [45] However, in contrast to the 1960s radicals who resisted the creation of anything more tangible than drawings, sketches or architectural models, makers of AQE fully engaged with the present day condition of neoliberal capitalism and the lean start-up paradigm by creating an object, a commodity, however crude it might be. [46] While often today, due to the recuperative capacities of capitalism, it might be difficult to draw a distinction between the ideas of radical 1960s and contemporary start-up cultures, it is the methods and vision of this project that has echoed 1960s' ambitions for experimentation in and thus the sustainability of a public space. [47] Likewise, by creating a cheap and accessible air quality measuring kit it has brought us a step closer to a popular access of atmospheric data. Making such data accessible is one of the key reasons of this network even if access is currently guarded by LogMeln and its cloud security. The very presence of this network, as it negotiates the space of public and private in the

digital realm, could be seen as a question addressed to the new data driven technological paradigm. Undoubtedly, the main positive outcome of this communal exercise still is the fact that the Air Quality Network provides a live and open access to atmospheric data and as such a common resource that creates opportunities for other developers to build application, mashups and maps on top of it. The accuracy of the data is of less importance here as imagination could be triggered and comparative maps could be drawn on proximity and abstractions. What this story has opened up, however, is the reality of even greater uncertainty that sensor technologies and digitalization of physical environments present. Thus by the use of open source technologies and other DIY approaches, the project has undermined the greater IoT promise that just like the electronic battlefield of the Vietnam war is still largely delivered on high-tech promise, often dysfunctional in physical space.

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EXTREME ENVIRONMENTS: HONG KONG'S ART+SCIENCE EXPEDITIONS

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ABSTRACT

Hong Kong's Extreme Environments program explores how student artists, researchers and scientists working together can collect and interpret environmental data using new forms of creativity and visualization. The program promotes interdisciplinary research and discovery as an integral part of learning. The planet's most remote landscapes are among the most fragile and endangered but also offer unique insights into a sustainable future. This project brings together teams from across the academic spectrum to help better understand issues that threaten nature and our cities. A groundbreaking experiment in transdisciplinary art+sci education, field research becomes a creative strategy and media art becomes a tool for scientific interpretation.

INTRODUCTION

To date, the expeditions have partnered with scientists in the Mojave Desert and Antarctica with an upcoming trip to the underground caves of Vietnam. Using computational sensing to collect a variety of datasets, interdisciplinary teams of students from such fields as art, business, engineering, natural science and social science conduct research in remote locations. They then develop new media art projects that utilize new presentation technologies to offer innovative approaches to understanding climate change. The exhibitions present environmental data through new media artworks in diverse technologies like mobile game applications, light installations, interactive cinema, 3D immersive environments and kinetic sculpture.

The program hybridizes endangered ecosystems differently than approaches in urban spaces. The remoteness of the site makes it nearly virtual—not physically accessible by most of society. The students use scientific study and documentation to give a distant user a multisensory experience of the sites. In Antarctica, 23 students took over 70,000 photographs, 100+ hours of video and over 85 scientific datasets and were followed by over 10 million people. While there, the students are avatars in a foreign landscape and their physical and emotional responses become performative. Upon their return, the natural forces measured the site are reconstructed by transforming the data into user experiences that include sonification, immersion, interactivity and performance.

RESEARCH-BASED ARTS EDUCATION

The program follows a structured sequence of proficiencies. During the planning and on-site expedition, the students learn a scientific data collection skill. It's key to note that the science is not meant to be groundbreaking but meaningful – a series of experiments that connect to a larger international body of science. The students learn the technology to do the readings and then the proficiency to do those readings in difficult conditions. The expeditions encourage the development of communication and networking skills as well as a set of personal strengths.



Fig. 1. *Students Measuring Air Quality with Lasers in Antarctica, 2014*, photo, property of City University of Hong Kong.

Upon returning, students must master a wide range of computational skills to find hidden patterns and meaning within the collected datasets. They also must visualize their projects through modeling and design software. This requires organizing, library and lab research and investigation into emerging technologies for data manipulation and presentation. The artworks themselves require a range of budgeting, engineering, planning and design skills to be developed. Students learn the business logistics of media production (e.g. film, print, web, application), manufacturing or fabrication.

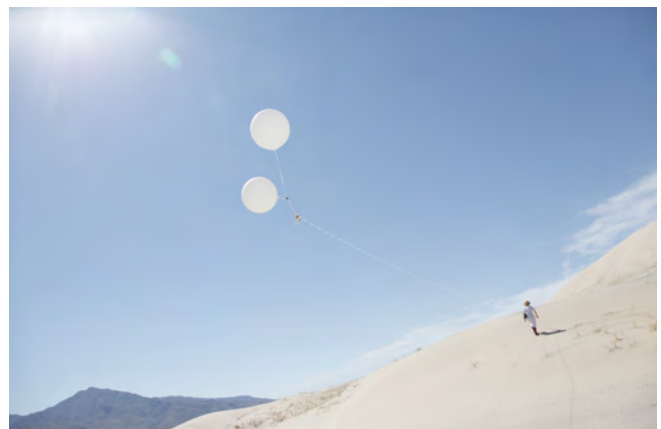


Fig. 2. *Student Capturing GPS and Altitude Data with Aerial Sensors in the Mojave Desert, 2012*, photo, property of City University of Hong Kong.

Using emerging technologies to present the creative interpretation of their data encourages technical proficiencies that draw from both the physical and virtual learning done earlier in the process. However, the students also write and create their artists statements and document their process so that it can be presented

to the public in an exhibition and website. In steps, students learn and master scientific equipment, form partnerships and self-discovery, analyze with computers, budget and plan a large project and present it to the public both professionally and using the latest technology. Without the journey as the metaphoric and structural model for learning these skills individually, they would be difficult for one course to teach.

ART + SCIENCE

Project development is bottom-up: the students find classmates across disciplines to form teams. Every project is a hybrid of two or more fields of study that was envisioned and organized at the student level. Because of today's social networks, friendships, hobbies and interests become the foundation in joining fields.



Fig. 3. *Nine Different Sensors on the Kite and Student Capture Wind Data in Antarctica*, 2014, photo, property of City University of Hong Kong.

Each team then partners with scientific and academic researchers who share their approaches and tools. In Antarctica, students worked aboard a Russian polar research vessel with ornithologists, historians, botanists, geologists and other specialists who supported the study of such subjects as penguin colonies, glaciers, icebergs, wind patterns, plant life, animal behaviors and more. Delicate eco-balances are measured by learning the most current sophisticated sensor and locative technologies. A student learns how to produce meaningful data that is inextricably linked to the natural features of the sites. The environmental 'footprint' of this program is designed to be zero, partnering only with scientific organizations that are dedicated to the protection of endangered resources to ensure that no project is invasive or damaging to the environment. The presentation of that data requires in-depth artistic research in visualization strategies, often well outside the area of study for the engineering and science students in the program. They learn how contemporary arts are embracing technology and using it in directions that often are prescient. Students learn computational and procedural programming as a generative art strategy, new 3D printing possibilities, advances in screen and projection technologies, new robotics, new interactions, new styles, new formats.

Merging research methodologies creates a context where a skill, scientific or artistic, is no longer specialized but integrated into a larger context. Unexpected hybrids form when the established goal of a field of study is diverted – an engineering skill is applied to art, an art skill applied to science. Specialization does not mean a singular path; the specializations from different fields can be applied to new contexts and yield innovative ideas.

EXTREME HYBRID SPACES

The presence of the students and transmitted environmental data forms a unique hybridity at the sites. The 23 students were followed either through social or traditional media by millions of people and become avatars in the same way an astronaut is followed remotely. Nature is studied but users also observe the observers through an array of sensors, field research, interviews, questionnaires, experiments and data mining techniques. The student teams wore 'black boxes' 24/7 that continuously measured location and altitude. In Hong Kong, friends and family saw locative information on their student but also comprehensive environmental information such as weather, ocean depth and water sample statistics, expedition data such as voyage charts, wildlife sightings and GPS information and personal and cultural data such as diet, correspondence and physiology. One remote artwork extrapolated the GPS and altitude data to reveal the terrain – the students unknowingly 'surveyed' the sites visited. Another artwork pulled keywords from the student text and email messages home and developed an algorithm that tied emotion to place, mapping the feelings of the team so far from home.



Fig. 4. *Installation Showing Topography Captured Through Student Movement in Antarctica*, 2014, photo, property of City University of Hong Kong.

MEDIATED EARTHWORKS

Upon the return, however, the hybrid space flips. Instead of a virtual visitor to a physical space, the space is mediated and presented to physical visitors. Forces of nature, captured through numbers, become the drivers in a new media artwork. Computational sensing allows for more than just memory through image, it allows for place to be recorded and replayed in new sensory contexts.

For example, Antarctica wind movement was measured through a kite-surfing performance and contrasted with Hong Kong's 'wall effect'—the density of architecture that blocks cooling entry. Visitors could actually compare wind movement through an interactive system. UV-B radiation was shown through lichen growth and skin damage, microscopic organisms presented in an immersive environment to emphasize their importance and air pollutants were measured in Antarctica and Hong Kong and compared through 'veils' in a massive light installation. One project compared the color spectrum of the South Pole's pure light with Hong Kong's artificial (the most light polluted site on the planet) and presented the colors in a 360-degree theatre. The invisible forces within nature were captured and then visualized in new forms.

Two projects investigated social components. One team investigated criminological, psychological and environmental topics related to isolation through interviews and site measurements of prisoners, field scientists, military personnel and ranchers and tied their findings to a live street performance in a 1.5 x 1 x 1 meter 'cage flat.' Visitors could gain insight into Hong Kong's own extreme environment: the restricted, cage-like flats that house thousands of its population. Another team investigated Antarctica's bartering practice. With no currencies, money circulation or government regulations, Antarctica has a unique economic system with personal social interaction built into it. The team collected data by creating a hands-on barter experience during the length of the expedition. Visitors to the exhibition could take a specially made souvenir but only by trading it for something in their pockets. The team presented the direct exchange of goods and services as an effective, sustainable and environmentally responsible solution but also a type of social network to exchange culture, values, knowledge and business information.

CLOSING REMARKS

Dean Jeffrey Shaw provided the closing remarks for the exhibition. "Art practice in the 21st century is no longer a purely self-focused enterprise. The exigencies of the contemporary social and environmental contexts create new urgencies that call upon the artist's inventiveness and insights to contribute to a better understanding and to possibly even provide solutions. Therefore it is the responsibility of arts schools today to cultivate in students in their training the desire and capability to address these contexts. This implies the ability to work in trans-disciplinary groups and develop the communication skills that enable artists to engage and integrate the language of their practice with those in other fields. Only in this way can they be equipped to creatively address the full complexity of our current condition." [1]

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CREOLIZED OLFACTORY SPACES

Gwenn-Aël Lynn, Independent, Chicago | Paris

ABSTRACT

Using the examples of two interactive sound and smell installations, I problematize the concept of location by observing how creolized spaces can embody a multitude of spaces. I provide a definition of creolization and I discuss the nature of olfactory spaces and how they question the visual hegemony of Western culture. I also describe the techniques of scent diffusion and the relation of these two installations to the social sciences. Once I have contextualized the works, I set out to evoke a multisensory aesthetics.

INTRODUCTION

With this paper I am going to give the example of two interactive sound and smell installations. I have created the word *audiolfactory* to describe this combination. Both scents and sounds share the same medium of propagation: air. Moreover, our olfactory auditory cranial nerves cross at perpendicular paths in our skulls. The first example is an untitled piece from 2006 and the second one, was included here at ISEA2014. It was exhibited at the American University of Dubai and is titled *Audiolfactory Creolization*. These works problematize the concept of location by observing how creolized spaces can embody a multitude of spaces.

EXAMPLES

I made *Interactive odor and sound installation* during an artist residency in the Netherlands, sponsored by the European Pepinieres for Young Artists network, Transartists and the media department of the AKI in Enschede. It was built with Max-Msp and consisted of infra-red sensors, a MIDI-Box, custom made scent diffusers, speakers and muslin to cover the scent diffusers. Muslin is at once porous to let the olfactory molecules float out, but opaque enough to soften the rough appearance of the electrical diffusers. By its nature, muslin behaves like scents, it moves when there is an air draft, is very soft to the touch and only partially conceals what it contains. The scent diffuser is made with Pebax and a computer fan. PEBAX is a high retention polymer. It comes in the shape of beads that are soaked into fragrant oil. By blowing a fan through it, one can release the olfactory molecules. Depending on the size of the fan one can blow a lot of air (and make a lot of noise) or by using small computer fans, keep the scent localized around its diffuser. The Midi Box is an open source project conceived by Thornton Klose. [1] It uses a Midi protocol to sense motion and actuate the scent diffuser and the audio files.

With that project, I wanted to come up with a postcolonial definition of the contemporary Netherlands. In current European discourse and in particular in the Netherlands, despite years of immigrant labor and influx from the former colonies, identity is still defined from the center, the White Dutch majority. I wanted to shift that definition to be in phase with the social and cultural changes that are in process in the Netherlands. To achieve this,

I met and engaged with Dutch nationals who had some sort of affiliation with the former colonies. Some of these questions and stories were integrated, along with music composed by Antony Maubert, into the sound part of the installation and others (I had a lot of data) were indexed on an audio CD that was released with the opening of the show in Enschede. The soundtracks of this project total 8 languages (Afrikaans, Bahassa, Balinese, Dutch, English, Papiamentu, Taki-Taki and Zulu). It is by no means exhaustive of all the languages spoken in modern day Holland, but it reflects the people I met while in residence. During our conversations I asked them if there were any particular scents they associated with their post-colonial experience. These became the olfactory component of this installation. I worked with Michel Roudnitska to design the scents (who also worked on the project installed here in Dubai).



Fig. 1. *Interactive odor and sound installation*, 2006, Gwenn-Aël Lynn, interactive installation, © Gwenn-Aël Lynn and © Martin van Loosbroek for the photograph.

Though at the time I made this project, I did not think of it in terms of creolization, one can see how the question of hybrid identities was already present. Before I go any further, I would like to explain my understanding of creolization. It is a term mostly defined by Edouard Glissant, a Martinican poet, in his *Caribbean Discourse*, but I also draw inspiration from the *Dictionnaire du métissage* by Frédérique Laplantine and Alexis Nouss. [2], [3] Though creolization is rooted in the Caribbean experience, one can find, different but similar processes of mixed identities in other region of the world: Brazil, India and of course here in Dubai.

Some of these places are already creolized (the Caribbean, Brazil, India) some are undergoing, albeit with difficulty, creolization. Creolization is an intercultural process that allows for multiplicity, a mixture where the different parts remain autonomous, a place of endless permutation. It is in constant flux. It embodies the multitude. Creolization gave birth to new languages: Creole(s); new religions: Voodoo, Candomble, Santeria; new ways of cooking: Caribbean, Reunionese, Mauritian, Brazilian, Mexican, etc. It is not about purity, authenticity or hegemonic "mono" identities.

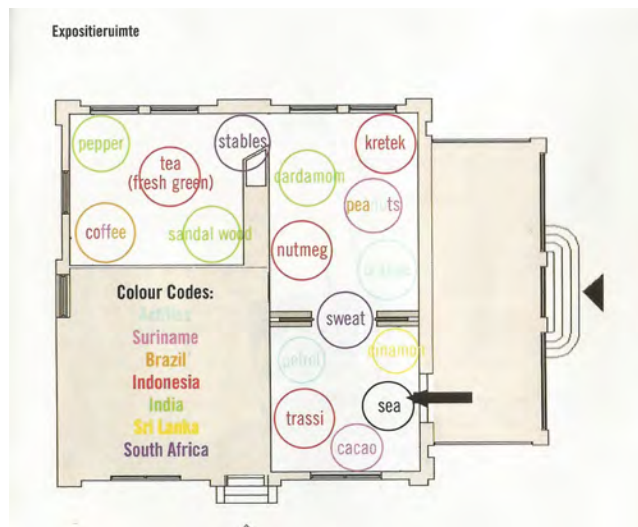


Fig. 2. *Interactive odor and sound installation*, 2006, Gwenn-Aël Lynn, floor plan at Villa DeBank, © Gwenn-Aël Lynn.

My second example is *Audiolfactory Creolization*. A work I started in 2009 and completed in 2013. I made it in Chicago, so as such, it reflects the experience of Chicago. Immigrants have always taken a little bit of their homeland with them and then they reproduce some of it in their new place. This reproduction is never a clone, it differs from the original, so then in-between spaces start appearing. These are creolized sites of struggle. Because of its history and its racial ideology, the United States is by no means creolized. Yet there are many, particularly in Chicago, who could qualify as creolized or at least with having a “mixed identity.” In fact, parallel to ISEA2014 Dubai, there was another academic conference that took place in Chicago: the “Critical Mixed Race Studies Conference.” Scholars from all sorts of disciplines gather to share their research on the Mixed Experience. 2014 was its third iteration. It shows that identity and race is shifting in the US. I should say that I am French and American (I have a parent from each country) and so I don’t feel like I fit in the North American Identity process. Instead, creolization gives me a place that I can navigate and more importantly where I can meet and share with other people, who are not like me, but who also possess this sense of belonging to a multiplicity rather than a single group or community. This creolized place is not only racially or visually motivated; it is linguistic (for people who command more than just English) and last but not least, political, because it calls in question the hegemony of certain groups over others. When one commutes through Dubai, she can also hear many languages spoken on the streets and buses and metro of Dubai. Though this project was conceived in Chicago, it echoes the multiple identities of Dubai. In order to hear what other community members, coming from the “Mixed Experience,” had to say about this I had conversations with them. These conversations resulted in *Audiolfactory Creolization*. This project was exhibited here, at the American University of Dubai, although for logistical and time reasons I was able to install only a portion of the entire work.

This installation uses the same diffusion system than *Interactive Odor and Sound Installation*, namely Pebax and fans. However it entirely runs on Open Source Software. It is built with Processing and Pure Data and instead of the Midi-Box it uses an Arduino to communicate between the physical world and computer language. The sensing is done with video tracking instead of infra-red sensors. I find it easier to define pixels coordinates as trigger areas, than having to try creating a mask for the invisible infra-red wavelength in order to calibrate the sensors.

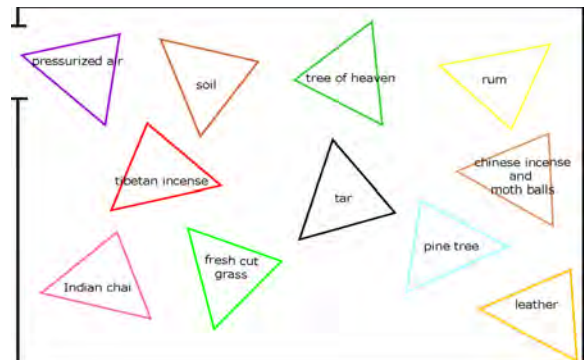


Fig. 3. *Audiolfactory Creolization*, 2013, Gwenn-Aël Lynn, floor plan of Interactive installation, © Gwenn-Aël Lynn.

LOCATION

If the creolized subject embodies a multitude of places, then it brings into question the notion of locational identities understood as deriving from a place. Creolized or mixed subjects, by definition belong to more than one place. They embody and carry within themselves, a plurality of localities. Similarly, especially in our globalized age, a location can house a multitude of locations embodied in its creolized residents. Chicago loves to describe itself as a city of neighborhoods, where each neighborhood is inhabited by a particular ethnic group, a plurality of locations within a location. Dubai and the Emirates have long been engaged in similar dynamics.

METHODOLOGY

The method to gather the data for these two projects is very similar and appears to be related to the social sciences, but it differs in its goal and its analysis. While it borrows from social sciences methods, its goal is actually not so much to analyze, quantify or measure, but rather to express, to reveal. It also acknowledges that it is not exhaustive and definitely does not seek to “represent” an experience. In social sciences, the questionnaire undergoes a process of refinement until it narrows down to just a few key targeted questions. Instead, our conversations remain voluntarily open, spontaneous and attentive to the unexpected that my interviewee might say. Then the editing process for the olfaction is done based on what is technically feasible (can the perfumer reproduce this scent?) Are there common threads between the interviewee’s words? This latter question would be one form of

objective data: is it shared by more than one subject? And finally there is the inevitable element of subjectivity on my part in settling on one scent over another one. Inspired by the works of Edmond Roudnitska, I have conceived a “template” to relate scents with sounds. [4] The scents are analyzed for a number of qualities such as: temperature, texture, weight, acidity etc. and then these are translated into sonic compositions by the musicians to supplement the scents, in order to assist the visitor recognize and understand the fragrances. Interview abstracts are also embedded in both projects. They are chosen based on their relevance and on how they “qualify” the scent. The audio helps to build an olfactory discourse.

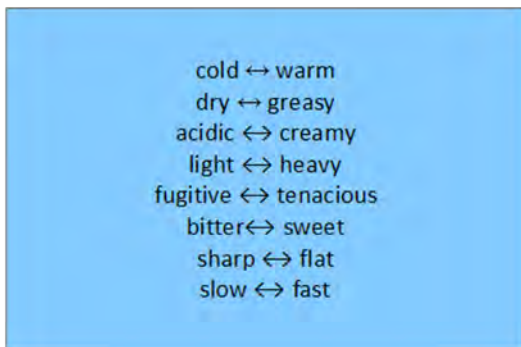


Fig. 4. Instances of olfactory scales, Gwenn-Aël Lynn, © Gwenn-Aël Lynn.

SPACE AND TIME

The forms of spaces that these two projects have generated are at once disseminated, networked, simultaneous and localized. The scent stations are distributed throughout the exhibition venue, in no apparent pattern, with some negative space between each other, so that it allows olfactory and aural silence. This negative space prevents the scents from contaminating each other, which can thus fade on their own. The installation is electronically networked, but it is also sonically networked, since the sonic compositions echo one another. The distribution of scents in space is organized along their respective qualities, making sure that the visitor does not start with an overpowering smell (like leather) that would prevent her nose from perceiving the more subtle ones (like Fresh Cut Grass). It is the visitor who, in the end, after having charted her own path, pieces together the various elements to make sense of the sensory and audio stimuli she encountered during her visit.

I say the scents are localized because they exist only near their respective stations. Hence, though the installation spreads all over the gallery, each scent is localized within specific portions of the space, but there are no screens or barriers. Interactive technology controls their dispersal. In addition, since each scent results from the recommendations of a participant, they are localized within the experience of that participant. Thus the installation can be disseminated in its entirety but localized in each singular scent. In these works, olfaction provides a meandering

experience, very much like the trace one leaves behind when wearing a perfume. The temporality of this installation is potentially simultaneous, but each visitor by charting her own path creates her personal time line, while each fragrance, once released, evolves in time and space at its own pace, thus this simultaneity also contains some elements of linearity.

VISUAL HEGEMONY

I often get asked how I became interested in olfaction. There are many reasons, but the main one is the idea of “representation.” With all the technology and the gadgets we carry with us today, more than ever, we live under the predicament of a visually centered culture. As a matter of fact, the idea of political representation is visually motivated. The concept of race, so prevalent in the post-colonial world and in particular in the United States, is based on the visual appearance of someone. [5] But what happens when we shift our senses away from all this visual stimulus? Identity can also be found in food, sounds and smells (and many other things). My work from the last 12 years investigates the following hypothesis: if we establish that visual media enforce the cultural hegemony of their owners, then what happens when we shift the focus of art making to senses that are less linked to this hegemony? Jean-Luc Nancy, in his book *La mondialisation ou La création d'un monde*, observes how fortresses were always built above, in order to survey the land with the senses of sight and hearing, senses of distance. [6] He operates a distinction between the senses of distance and the senses of proximity: taste, touch and smell. In lieu of a sensibility of closeness, through touch, scents and taste, the master rules with his organs of distance: sight and hearing. [7] If we were to establish a parallel with today, it would be very easy to observe how skyscrapers, symbols of finance and capitalism, dominate our skylines and are actually taller than most historical fortresses. As mentioned earlier, race is first and foremost something that we see. In her article, “Performing Remains,” performance studies theorist, Rebecca Schneider argues that in Western culture, artefacts must remain in order to be considered valuable. [8] Within that perspective, scents, much like performance art, pose a serious problem because they are transient and do not remain. Rebecca Schneider points out the “ocular hegemony” of the artefact. The artefact and the archive are valuable because they are “permanently” visible. Rebecca Schneider contests the ocular hegemony of the archive on the basis that performative practices do remain in the body and the memory of their practitioners and viewers. Those remains are intangible. As I have mentioned earlier, Western culture looks down on the sense of smell, precisely because it is difficult to archive it, because it is intangible. Some of my current practice, is an investigation into other modes of addressing issues related to identity than through the visual archive or representation.

In the instance of *Audiolfactory Creolization*, a data visualization software and computer vision are used to generate non visual material. Indeed, the visual objects that are the pods lure in the

viewer, whose displacements are visually tracked. In return, she is sonically and olfactorily stimulated. The interactive process turns the viewer into an actuator. Surveillance technology is led astray from its hegemonic potential, to provide an experience that goes beyond the strictly visual.

MULTISENSORY ART

Within the Western cultural context, it should be no surprise that multisensory art is difficult to make because, we, in the West, are not trained to make such work, but also the science and technology for it is not as advanced, at least when compared to what has been historically deployed for vision and hearing. Wagner's *Gesamtkunstwerk* is the closest thing we have to a Western theory of Multisensory art, though it is predicated on a visual and acoustic spectacle: seated visitors contemplating a distant visual and sound event on stage. Since viewers were kept at a distance, their sense of touch, smell and taste were not engaged. Since the days of Wagner, we have had many experiments in non-predominantly visual art, from the Futurist dinners, to Fluxus, to Rirkrit Tirvanija and more. However I cannot think of an artwork that engages all five senses equally and simultaneously. Tiravanija's work engages the sense of taste. Lygia Clark's later work engages the sense of touch. My earlier work engaged the sense of taste, now it is smell and sound. Multisensory art has long existed in India, in Indigenous Amerindian culture and other parts of the world, but it is new in the contemporary Western world. We have only recently begun to learn how to make "cross-modal work," to use David Howes' expression, an anthropologist from Concordia University in Canada, who directs the Center for Sensory Studies. [9] The most difficult part of a cross modal practice is that what may work for one mode, say the visual mode, may not work for the olfactory mode. So it becomes about being able to conceptualize and solve problems, in multiple dimensions, instead of just one or two. This is when the notion of template, that I have explained earlier, becomes useful.

CONCLUSION

I hope to have conveyed with this paper the potential of an *audiolfactory practice* to question the notion of location and to have provided some clarification regarding the challenges of a cross-modal practice in contemporary new media arts. Namely, a cross-modal practice is struggling with an ocular centric legacy. Can emerging technology be led astray from the surveillance apparatus to foster cross-modal practices and engage in a critique of Western visual hegemony? Can immersive and emerging technology constantly monitor itself to avoid becoming a hegemonic agent (be it visual, olfactory, aural, etc.)?

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4. Edmond Roudnitska, *L'esthétique en question : introduction à une esthétique de l'odorat*, (Paris, P.U.F., 1977).
5. See for instance Mark Alizart, *Rencontre avec Stuart Hall*, (Paris, Centre Georges Pompidou, 2005). Video. 01H00m12s. <https://www.centrepompidou.fr/cpv/resource/cynz4K4/rrbeyLq>
6. Jean-Luc Nancy, *La mondialisation ou La creation d'un monde*, (Paris, Galilée, 2002).
7. Jean-Luc Nancy, *La mondialisation ou La creation d'un monde*, 146.
8. Rebecca Schneider, "Performing Remains," *Performance Research* 2, no. 6, (2001). However, I am referring here to a newer and undated unpublished version of the same paper that was handed to me by my Chair while attending the graduate program in Performance at the School of the Art Institute of Chicago in 2006.
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CONSTELLATIONS AT THE INTERSECTION OF PUBLIC AND PRIVATE SPACES

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ABSTRACT

Through the creative use of digital technologies, responsive environments are created, interstitial territories become “activated zones” of everyday life in public, as well as private spaces. INSERTIO’s art interventions actuate urban space and its infrastructures, revealing issues implicit to the site, the technologies themselves in a specific cultural context and the creative actions used to transform public space in a tangible way. In specific, several distinct themes are explored: interstitial space, DIY device art; the notion of wireless, meshed networks; hacking and real-time technologies extend the parameters of aesthetics to the realm of the invisible forces of pure dynamics creating a complex, multilayered reality. This paper examines specific tactics of occupation and imbrications of urban infrastructures exemplifying INSERTIO’s use of site, devices and art actions that fuse with the emerging discourses surrounding the issues of art, architecture and urban spaces in the age of the networked landscape.

INTRODUCTION

INSERTIO is an inter-university research and creation laboratory formed around the coalesced problematic of the interstitial¹, architecture, ubiquitous computing and the city raised in the context of art. Currently integrated in a social housing complex, Insertio is probing the poetic and sensorial potentials of new relations between the inhabitants, the place, its history, technology and new modes of socialization. The laboratory aims to achieve site-specific creation projects that are potentially nomadic, incorporated in architecture and the urban landscape. Insertio brings together three researchers: James Partaik, artist and professor at UQAC (Chicoutimi, Canada), Luc Lévesque, architect and professor of Art History at *Université Laval* (Québec City, Canada) and Hernando Barragan, professor at *Universidad de Los Andes* (Bogota, Colombia) artist, designer and inventor of the Wiring platform.

Our research program on architectural interactivity raises questions of the architectural interface in the context of the “Everyware” paradigm. [1 - 3] Can this interface still be conceptualized as a skin or an interactive shell as suggested in the 2000s by several digital technology experiments in architecture and what tends to be still often reduced to the typology of the “media facade”? It seems to us that other avenues to be explored today deserve more attention. It is in this context that we propose the hypothesis of the interface as constellation – as a mobile and reticular swarm of micro-device insertions transversely overlapping the domestic sphere of housing, the architectural envelope and the urban environment. Our research program mainly focuses on

the development of such micro-devices and the testing of various potential arrangements of their implementation in “constellations.” What we mean by micro-device is a physical system of miniaturised components able to capture and disseminate networking information to produce different modalities of performance and interactive experiences. These micro-devices, attached or grafted to household objects, to architectural components (internal or external) or to elements of the wider urban environment, constitute a connected network (wireless) at variable geometry – what we call a “constellation” – that circulates information among heterogeneous environments.

This research program emerges from a reflection developed over fifteen years by various research-creation collaborations between members of the laboratory. It has also been generated by experience and common reflection on the specific nature of the site where the lab moved to conduct its exploration: the site of a housing cooperative located in Québec City at the interface of the Saint-Jean-Baptiste working-class neighborhood and the Parliament Hill. This cooperative, where one of the members of INSERTIO – James Partaik – is involved as an artist and resident since 1993, is also the site of the project Line of site V (Arqhé²) that was important for the genesis of our current research. [4]

Line of Site V (Québec City, Canada, 1999-2000)

The expression “Line of Site” embodies in our practice a series of in situ multimedia works questioning art, architecture and urbanity at the junction of various and often paradoxical contextual dynamics. The site chosen for “Line of Site V” project fits from many aspects this paradigm. Located at the strategic interface between a working-class neighbourhood – Saint-Jean-Baptiste district – and the prestigious settings of the Parliament Hill, the target zone is at the core of a recurring urban debate. At the intersection of a residential street with lots of pedestrian traffic and a monumental urban boulevard with imposing public and government buildings, the intervention site is composed more precisely of a street level apartment (part of a Coop Housing building) and the adjacent lot. The building targeted by the intervention was at the “front line” during the seventies when, in the wake of Parliament Hill’s urban expansion plans, many demolitions affected the residential fabric of the historical districts outside the fortified city. In fact, according to this “heroic” modernist planning, almost all of the nearby residential area was to be destroyed. The bulldozers were finally stopped through public pressure. The building, in and along which our project takes place, was next in line in the eradication process.



Fig. 1. Arqhé, *Line of Site V*, public passage, © Arqhé, 1999-2000.

The central element of the intervention is to operate a “public passage” through a ground level apartment inhabited by James Partaik. This unusual incursion of the public in the private domain is an opportunity to experiment very concretely the potential of interface situations. The passage consists of an independent architectural structure, which cuts through the apartment passing through the two entrances. The exterior doors integrated in the passage’s walls allow the inhabitants to access the two parts of their apartment, temporarily sectioned but still functional. By its positioning and its orientation, the passage diagonally links two perpendicular sidewalks, offering a possible shortcut to the numerous pedestrians that circulate between the office buildings of the Parliament Hill and the commercial street of the residential district, two blocks down to the north. This singular crossing between public and private intensifies the interfacing aspect of the passage’s surfaces (walls, ground, ceiling), which constitute a focal point of the project. Different devices (showcase, openings, periscope, cathode screen, camera, micros, speakers, sensors, etc.) are used in the realisation of the passage. The intervention is completed outside by luminous signal structures and a projection system (website/video) integrated to the residential building and visible at distance from the boulevard.

The assemblage created by *Line of Site V* actually collapses three heterogeneous domains: a website visited by cybernauts, a “public passage” crossed by passers-by and an inhabited apartment. Each of these domains is susceptible to modify the two others or to be modified by them. This three-pole system is conceived to thwart the binary condition of a common action/reaction interaction by multiplying the variability of possibilities. From the website, the cybernauts can transform through a domotic interface the physical parameters of both the passage and the habitat (lighting, soundscape, projected images, etc.) while the passers-by crossing the passage actuate variable sequences of sensors/camera to modify the actual site’s video views and specific content offered on the web to the cybernauts. The

incursion of the pedestrians into the habitat is also obviously not without effect on the daily life of the inhabitants who control, in other respects, the mediating function of the passage’s surfaces by varying the sensorial modalities experimented by the passage’s users. The inhabitant can finally also interact with the cybernauts by directly modifying the conditions of his home and the position of the mobile video camera or by feeding the “in progress” content of the web site.



Figs. 2, 3. Arqhé, *Line of Site V*, © Arqhé, 1999-2000.



Fig. 4. Additional housing building on the site where is presently located the INSERTIO lab, © James Partaik, 2011.

Line of Site V blurs the line between private and public, real and virtual domains. It also gives rise to new research on the conceptualization, development and eventual construction of an additional housing building on the site where the INSERTIO lab is presently located³. During the conceptualization of the

architectural design and the negotiations between housing cooperative and the City of Quebec, we developed and experimented with prototypes and ideas of informational and relational devices exploring the diverse range of performative and experiential configurations that allow for different scenarios of actions and insertions.

CityHACK (Fribourg, Switzerland, 2006)

CityHACK, a project developed by SpaceKit, James Partaik, Julien Nembrini and Guillaume Labelle, for the 23th edition of the Belluard Bollwerk International festival, has been another key experimentation nurturing INSERTIO's actual researches. The project is a large-scale wireless intervention of audiovisual elements inserted in a public space. The work is built around the idea of "interference," and achieved by interconnecting, through a wireless network, existing networks that are not physically connected (public infrastructures, such as city lighting and private neon business signs, office lighting, parked cars, etc...). These systems, diverted from their primary uses create a furtive audiovisual orchestration.



Fig. 5. *CityHACK*, lamp with device, © James Partaik, 2006.

CityHACK uses a wireless network of microcontrollers (Wiring/Arduino + XBeePro), which activates and meshes together existing networks (infrastructure) that usually do not communicate. The interaction between these networks, consisting of nodes and relations, are remotely controlled live every night for a week (or a

predetermined time) in a public space. *CityHACK* focuses on the imagination of urban sites, their materiality and the memory usage. By interfering with what is normally a given "state" of operations, the installation reveals a progressive urban disorder. Places seem inhabited, animated. The passer-by is led to doubt his senses. At irregular intervals or in direct to response to reactions to the intervention, specific events can be combined to appear as failures or even paranormal phenomena. The device for this intervention is an electronic system developed specifically to hack public space by taking over existing systems. Technically, the work uses component hardware/software (Wiring/Arduino and Processing) specially developed to control a large number of basic components like as defined by ubiquitous computing. The system controls fifty devices or on/off switches very quickly, allowing the remote control of as many different machines, lights or other electrical objects.



Fig. 6. *CityHACK*, passersby witness the *CityHACK* intervention, © James Partaik, 2006.

The project is not a multimedia spectacle, but rather a discrete, furtive or stealthy intervention. The force of the intervention is its ambiguity. Just what exactly is happening? As such, it is intended to be an unannounced event that takes place in a zone of the city that is frequently visited by an habitual flow of pedestrians who are unaware of the nature of the intervention. The covert and furtive nature of *CityHACK* is crucial to the experience and the reading of the piece. As such, the invention should not be announced publicly. In Fribourg it was transmitted to the public of the festival through its documentation, which becomes an integral part of the work.

The project proposes a procedure in which the interpretation of what is seen and heard, is not taken as a fact, but is blurred and constantly sends the viewer off on another path. The visitor is not taken as a subject to captivate, but he is more like a traveler, taken in by his responsive surroundings. What is familiar becomes strange by the "détournement" of fixed reference points in the city through the completely invisible wireless control of infrastructures. Finally all the elements are coordinated and controlled live, leaving the field open to exploring the potential of sounds and lights of the city, the interaction with urban spaces and the diverse interpretations of what surrounds us.

Sound Transects (Dubai, 2014 and various cities⁴)

A transect is a virtual or physical line that is set up to study a phenomenon. In the wake of *Line of Site V* project (Arqhé) which established public passages (real and virtual) through a housing space, *Sound Transects* involves plotting transverse lines through the urban substance. Each of these trajectories constitutes in fact a “sound tunnel” that make possible to move from one point to another by passing through every looming obstacle – somewhat like a wave passing through solid material. Data collection and sound apparatus are developed to enable this virtual journey through the city offering alternatives paths of experiences and imaginations. Through *Sound Transects*, Insertio proposes an exploration of the potential of the domestic object augmented as a vehicle for the exploration of the urban fabric. A rotating chair, equipped with an electronic compass, is the center point of the installation. It is equipped with a grafted audio fader, a volume control, but here, volume refers to space, not amplitude. This control enables the user to move through the “sound tunnels.”



Fig. 7. *Sound Transects*, user of the augmented chair, photo Jaime Patarroyo © Insertio, 2014.

These tunnels carry the user through obstacles from space to space, from encounter to encounter, confounding normal movement and penetrating both private and collective spaces. By unveiling a series of recordings operated in concentric lines emanating from the epicenter of the installation – in Dubai, a constellation of about six hundreds sound samples – the user navigates, crafting a series of acoustic ambiances that incrementally create a whole new way of experiencing the city. Amidst the new urban landscape thus created, a new sensory rapport with the immediate environment is developed.

The installation creates a hybrid space in which the user generates a sound collage while navigating virtually through the urban soundscape interactively. The chair becomes a kind of urban concrete music instrument, a sound mixer through which the user can “play” the city while exploring its various sounds. It is a world that is revealed, a condensed auditory form where the experience

of the city itself speaks through the simultaneity of its diverse and multivalent expressions. While a single user, guided by sound, is operating the installation, other visitors can watch and hear his movements and displacements through various sounds constellations of the city.



Fig. 8. *Sound Transects*, detail of user interface of the augmented chair, photo Jaime Patarroyo © Insertio, 2014.

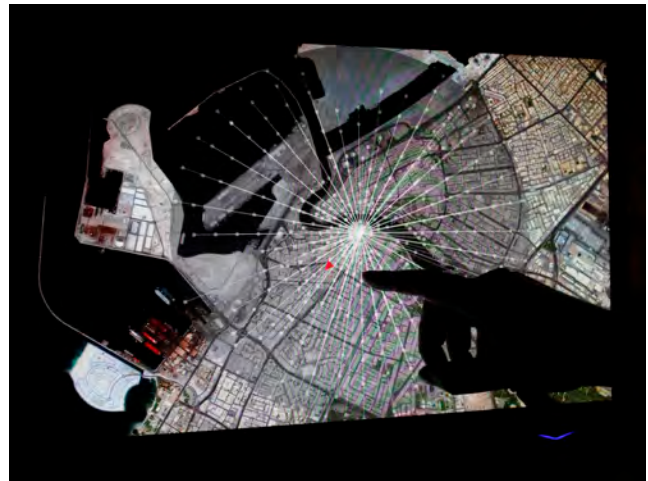


Fig. 9. *Sound Transects*, map, photo Jaime Patarroyo © Insertio, 2014.

Interface as constellations: a few premises of current research

Electricity has changed the genetic code of architecture. [5] Today, networking and computer systems generate the potential for a new architecture “cybrid” combining cyberspace and the real world of bodies, objects and materials. [6] Cyberspace generated by the information theory is inextricably linked to the new urban landscape and architecture. This space is embodied in new techniques of production and modes of socialization – the network society. [7], [8] If the network and “real-time” technology shape a revolution in our relationship to space, our entire habitat is a fertile breeding ground to explore what is being re-articulated not only in our relationship to space, but also in our relationship to the Other, the city and the world.

At the advent of digital technology, the discourse mostly focused on the influence of a virtual world, constantly growing and detached from concrete situations. The theoretical and practical emphasis of digital technologies was on the creation of “worlds,” cyberspace and virtual environments. But today we are witnessing the emergence of ubiquitous computing and mobile technologies [wearables] that open discourse to hybrid spaces. The development of the Wiring platform for artists and designers and its commercialisation through Arduino⁵, multi-sensory sensors and everyday devices (smartphones, tablets, etc.) are also in the process of reaching an impressive critical mass. This causes a shift in digital technology, where simulations of virtual spaces and immersion are substituted with interactive digital experience and perception extended into physical space.

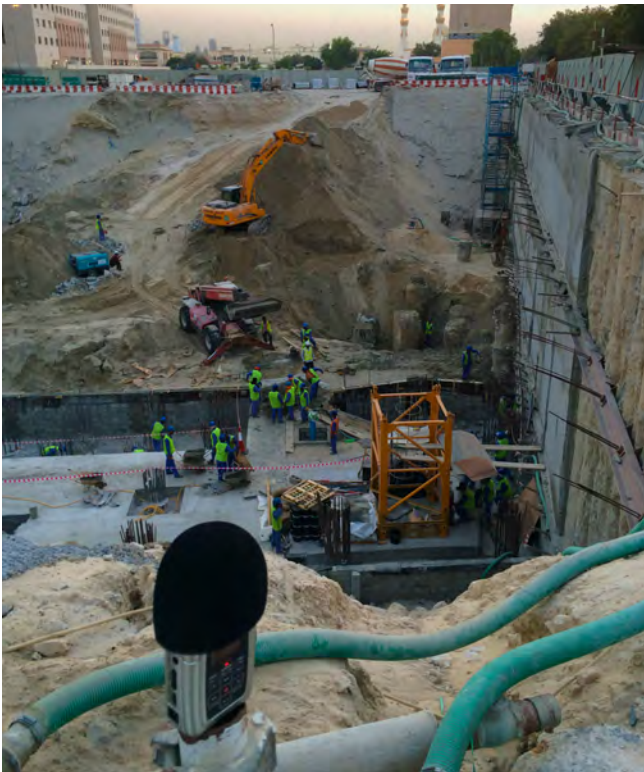


Fig. 10. *Sound Transects*, Dubai, sound recording of a construction site, photo James Partaik © Insertio, 2014.

Our current research focuses on the emergence of these hybrid realities in the context of everyday life. If one of the predominant features of the idea of a cybrid environment where the real and the virtual coexist is that this place is “neither private nor public” but rather “connective,” then our research on interfaces and interactive environments aims to absorb the political and social duality inscribed in this fringe or interstitial area. In this perspective we propose the hypothesis of the interface as constellation, as a flexible ensemble of more or less furtive micro-devices that collapse habitat, architectural envelope and the urban environment into a dynamic network of interactions capable of producing different creative experiences.

Technically, these devices use hardware and software components specifically developed to control a large number of networked elementary components. Thus, the device, through wireless networks, allows for both probing information related to real space and updating or modifying certain physical parameters of the intervention site. A set of sensors and actuators grafted to objects or architecture spatializes and controls a large number of elementary micro-systems using different modes of action and interaction. This networking activates a set of physical and informational parameters depending on the configuration of the constellations of micro-devices involved. As cited in this text, we are and have developed and tested various prototypes of these informational and relational “constellations” of micro-devices. Insertio aims to continue the development and implementation of these in situ “constellations” as a light and mobile infrastructure for the diverse range of performative, interactive and experiential scenarios.



Fig. 11. *Sound Transects*, Dubai, sound recording in a import/export business, photo James Partaik © Insertio, 2014.

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ENDNOTES

1. The interstitial relates to the notion of interstice (from the Latin *interstare*: to stand in between) which is usually defined as a 'small empty space' within a substance or between different elements. As such, the term refers to a series of interconnected notions that form a polysemous discursive field oscillating between connection and disjunction. The interstice as a void space within a substance can therefore refer to notions such as porosity, permeability, infiltration, passage, interval, spacing or threshold. In addition to its spatial character, the interstice refers also to a temporal dimension as an 'interval of time.' Indeed, the first recorded occurrence of the word in the French language – dating back to 1495 and attributed to Jean de Vignay – refers to time (*interstisse de temps*) instead of space. This aspect of the term is important since it would link the interstitial condition to the notions of transition, transformation, process and event. In the banal everyday substratum, an entire field of research is opened up to direct experimentation or simply to attitudes susceptible to create perceptual and existential breaches in the multiple landscapes and environments of the urban contemporary world, intervals of time and space opening onto unforeseen connections, other ways of seeing and experiencing the city. An interstitial approach to landscape would operate by 'bringing out' virtualities that exceed the dominance of the visual. By 'virtualities' we here refer to a 'realm of potentials' (Masumi 2002) or 'connections,' immanent to a given territorial condition, that can engage the past, the present, as well as the future. In this perspective, 'the virtual is not opposed to the real' (Deleuze 1968: 269), it constitutes precisely that part of the real opening the present to new imaginations and unforeseen experience trajectories. See: Luc Lévesque, "Trajectories of Interstitial Landscapeness : A Conceptual Framework for Territorial Imagination and Action," in Andrea Mubi Brighenti (ed.), *Urban Interstices. The Aesthetics and Politics of Spatial In-betweens*. Farnham: Ashgate, 2013, 21-63.
2. The Arqhé collective (1993-2000) defines itself as a laboratory in which art, architecture, the landscape, media arts and performance can be approached through the meeting and hybridization of viewpoints. It is composed of James Partaik, Luc Lévesque and Michel Saint-Onge. The artist and archivist Blair Taylor has also collaborated to the Line of site V project.
3. The resulting project won in 2012 the "Quebec City Architecture Merits prize" for medium density urban dwelling. The award winning interdisciplinary architectural design was given to the co-designers, artist, James Partaik and architect, Martin Brière.
4. Montreal, Canada, Mexico City, Mexico, Casablanca, Morocco, Quebec City, Canada, Sao Paulo, Brazil, Toronto, Canada, Piotrków Trybunalski, Poland, Sherbrooke, Canada, Chiang Mai, Thailand.
5. Arduino is the first in a series of clone projects that have been derived from the Wiring language. Often overlooked or ignored, it is important to acknowledge that this revolution in physical computing and tangible media is taking place thanks to the work of Hernando Barragan. "It is no exaggeration to say that Wiring has forever changed the craft of interaction design. The project is more than hardware and software, the documentation was thoughtfully created with designers and artists in mind, providing to them a means to understand a subject matter previously assumed to be the exclusive domain of skilled engineers. In time, designers and artists become able to reference their familiarity with Wiring to communicate and work with engineers more effectively; this bridge between disciplines has proven to be immeasurably valuable for the design industry. Most importantly, Wiring has established electronics a medium for art and design by serving as the foundation for a unified community, a common toolset with which to express ourselves, share our knowledge and work with one another." Nicholas Zambetti, IDEO, Palo Alto, California.

AFFECTIVE-RESPONSIVE ENVIRONMENTS

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ABSTRACT

This paper describes the concepts, media settings, strategies and methods of a media art work and an artistic research project. Both apply psychophysiological biofeedback technologies as affective interfaces between humans and artificial artistically-staged environments. The paper includes a comparison of media art creation with artistic research processes and intends to identify possible synergies.

INTRODUCTION

Together with the musician José Navarro and the architect Markus Braach we are currently working on the media art project "*Affective Environments*," supported by cultural funds. As the working title suggests, we experiment with biofeedback-driven environments, applying different media settings to make artistic statements. Interest in this approach also gave rise to develop the artistic research project *Designed immediacy: Atmospheric experience in an affective-responsive environment* together with our colleague Dr. Christiane Heibach from the IXDM (see affiliation). In the course of the next two years we will examine affective human perception in a mediated responsive environment, which will be set up as a physical atmospheric ubiquitous computing space in our new critical media lab.

In this paper we will describe the two projects, their media settings, strategies and applied methods. Furthermore, we will compare the approaches of media art and artistic research and look for differences and possible synergies.

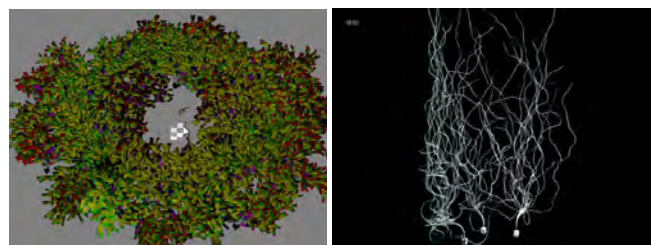
THE MEDIA ART APPROACH

Description

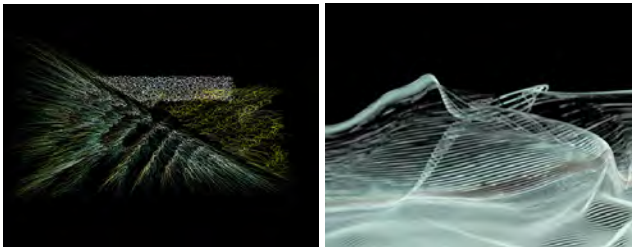
Affective Environments is a media art project that invites visitors to interact with three spatially arranged installations in an exhibition space. People get intimately involved in a public setting by connecting their breathing, heart-rate and skin conductance to the exhibits, thereby measuring their affective reactions. The psychophysiological data, which are processed in real time, alter parametric values and create new affective stimuli, establishing a human-in-the-loop feedback system. Visitors are influenced by and at the same time influence an abstract immersive game-world (exhibit 1: *Sense!* VR system), a video narrative (exhibit 2: *Reveal!* AV system) and a group of robotic creatures (exhibit 3: *Inspirit!* Physical Computing system).

For all three installations we apply biofeedback sensing technologies and work on the basis of psychophysiological interaction. Instead of the common categories of involvement, such as initial, reactive or creative interactivity, [1] the focus is set on the level of affect in a reactive environment. The work explores possibilities of interacting with artificial environments on a

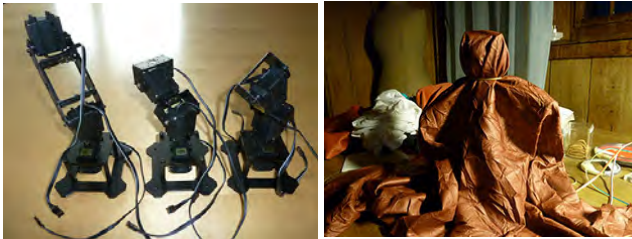
primordial level, by excluding reasoning and decision-making, thus establishing a more intuitive interconnection between humans and artificial surroundings. We calibrate, filter, average and map the biofeedback data to make the systems recognizably responsive but yet as personalised as possible to create an individual experience for each visitor. Since biofeedback only measures the level of excitement, but cannot detect if the respective person is e.g. happy, surprised, scared or amazed about a discovered principle, the context of the staged environment is crucial for the creation of content. In terms of perception psychology, it is questionable whether this approach makes it possible to correctly represent affective reactions to offered stimuli, but it allows us to experiment with human computer interaction (HCI) in a new way. Each of the three installations invites the visitor to engage in a game-like activity, challenging him/her to find a system of rules in an unknown surrounding. However, an important aspect is that we use the interaction process to make statements. The three-part work addresses questions of consciousness, such as: "What am I?," "Where do I belong?" and "How can I take influence?" With the immersive VR installation we intend to create attentiveness towards one's own body and affect and invite the visitor to interplay with his/her surrounding (Figs. 1, 2). In the audio-visual installation the visitor is challenged to reveal moving images of stereotypical paradisiacal settings by extracting them from an abstract three-dimensional space displayed on a monitor and headphones (Figs. 3, 4). To be successful, the visitor needs to stay calm and produce regular biofeedback data. This interactive process of extracting figurative images and sounds from an abstract data visualisation space is meant to represent the difficulty of finding inner peace and calling in modern society. The last exhibit is meant to engage the visitor emotionally by confronting him/her with robotic creatures. With their own heartbeat, visitors can revive an apparently weak creature, but unexpectedly find themselves in a situation of dependence when trying to leave the installation. This installation is meant to address issues like well-intended but inappropriate help, sustainable responsibility as opposed to the "missionary chauvinism of Western culture, etc." (Figs. 4, 5).



Figs. 1, 2. *Sense!*, 2014/5, Jan Torpus, Markus Braach, José Navarro. Studies for the VR Space.



Figs. 3, 4. *Reveall*, 2014/5, Jan Torpus, José Navarro. Screenshots of video sequences, dissolved in 3D pixel space.



Figs. 5, 6. *Inspiriti!*, 2014/5, Jan Torpus, José Navarro. Robotic arms (based on Trossen Sys.) and skin material tests.

MEDIA AND ARTISTIC STRATEGIES

Although the mode of interaction is the same in all three installations, they are based on different media approaches and artistic and dramaturgic strategies to create experiences and to engage the visitor in a hybrid entourage. The first installation audio-visually draws the visitor into its virtual space. The perception of image and sound is dominant in this synthetic environment, but the spatial qualities of VR create a lifelike immersive experience and allow free real time exploration. Sitting on a rotary chair – sensing touch, gravity and centrifugal force – connects the visitor to physical space. These remaining connections therefore have to be designed carefully, using appropriate surface materials and resistance of rotation as much as accurate effects of inertia in the virtual world to create senso-motoric immersion. [2] The spatial situation and appearance of the exhibit, including the biofeedback interaction device and the process of sitting down and putting on the head-mounted display is also important. It represents the transition and the ritualized act of entering the magic circle. [3] Tactical immersion is equally important and accomplished by a game-like structure. [4] The visitor becomes a player and has to find out how to navigate through the virtually staged space. The data tracks of respiration, heart-rate and skin conductance are linked to specific parameters of the virtual world and dynamically alter the immersive scenes. Applying established digital game principles, like a mission to be accomplished, a reward-and-punishment-system or the definition of hierarchical game levels, supports the basic comprehension of the narrative and allows more artistic freedom to create abstract poetic environments and to apply the unconscious biofeedback mode of interaction.

In the second exhibit the visitor gains access to virtual space through a window and is only acoustically isolated from physical

space by wearing headphones. The complexity of the media setting is similar to that of an everyday situation in real life, except for its location in a (culturally defined) semi-public space and the access to biofeedback. In new media exhibitions interactive AV-installations with interface devices are common and therefore do not constitute a barrier for entering the non-linear mystery story. The difficulty lies in gaining access to the narrative level during the interaction process: The story wants to be told, but it hides from the spectator. The figurative scenes will only reveal themselves, if the visitor interacts with dedication, patience and calmness. Technically speaking, the visitor needs to produce regular respiratory patterns, minimal heartbeat variability and stable Galvanic Skin Response (GSR) values. It is a game with one major threshold per video scene that is accomplished once the content becomes recognizable. At the beginning of each clip the biofeedback measurements are dynamically represented in an abstract 3D pixel space and only successful interaction on the part of the visitor leads to immersion in the preprocessed video scenes. For better access and in order to avoid too much frustration, the system sporadically offers easier entrances and displays a teaser when in idle state to spark the interest of visitors passing by.

In the third installation, the visitor remains in the physical exhibition space and is only digitally connected to the exhibit through the biofeedback human-in-the-loop circuit. The exhibit has a primordial affective impact because of the physical presence of robots resembling creatures with specific behavior patterns. It is just a disguised motor-driven sculpture with a biofeedback interaction device, but the visitor can mentally and emotionally enter the vivid “bonsai scene.” Biofeedback becomes visible through rhythmic robotic movements, confirming the visitor’s intentional interaction. The objective is to engage the visitor emotionally, to make him/her feel guilty and reflect on the individual experience in retrospect: inquisitiveness, the giving of well-intended and spontaneous help, increasing involvement, assumption of responsibility, excessive demand and irreversible consequences of one’s own actions. In order to involve the visitor in this exhibit, it is crucial that the behavior patterns of and correlations between the creatures are empathically recognizable. They have to create a situation of affordance, so as to invite the visitor to interact. Since the physical sculpture is rather unusual for an interactive exhibition setting, the interface device is a visual and integral part of the exhibit, meant to encourage interaction. [5]

BIOFEEDBACK INTERACTION IN AN EXHIBITION SITUATION

We gained some insights into biofeedback interaction in artistic settings with the video art installations *affectiveCinema 1 and 2* (2001 to 2003), based on real-time GSR measurements. [6] Interacting with an artificially staged object or environment based on personal emotions creates an intense encounter with one’s primal self. First of all, showing intimate emotional reactions in a public setting can lead to an uncomfortable situation and cause considerable distress. We are used to being able to hide or

suppress what is now suddenly on “public display” and visible to other exhibition visitors. Nevertheless, visitors sometimes become playful and develop surprising ideas as to how they can influence the system. Others uncritically accept the artistic setup as a mirror of emotions and personality and seek confrontation with themselves, at times to the extreme of worrying about their physical and/or mental health.

In everyday life we are expected to maintain control of our material surroundings, we are involved in causal processes and act and react according to our life experience. We are only used to communicate with other humans in affective, culturally encoded ways. Establishing a similar link to the material world creates an unknown and intriguing experimental situation. The installation invites the visitors to attentively observe, contrive and verify modes of communication. On the one hand, the entourage can be seen as a spatially arranged ambient display that mirrors personal emotions as a fancy data visualization, replacing simple diagrams. On the other hand, it can be perceived as a counterpart with artificial intelligence and emotion, which mainly evolves from the visitor’s interpretation. This tension between perception of intrinsic processes and encounters with something unfamiliar gives rise to interesting questions regarding people’s awareness of their own impact on the respective surroundings and their personal identity.

THE ARTISTIC RESEARCH APPROACH

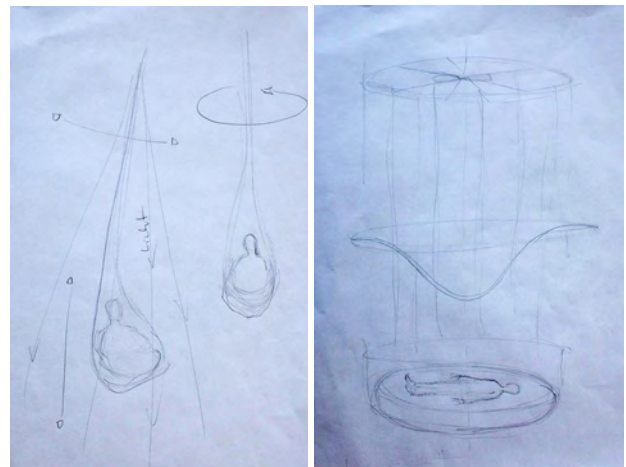
We explore similar questions in the artistic research project *Designed immediacy: Atmospheric experience in an affective-responsive environment*, funded by the Swiss National Science Foundation. Departing from a notion of holistic bodily experience and media, developed in current phenomenological approaches, we aim to examine the affective human perception in a mediated responsive environment. We are interested in finding out whether such an intelligent responsive space can be perceived as a second skin, as an endogenous but inspiring organ that questions our self-conception and influences our behavior.

We also refer to ubiquitous computing (ubiComp) technologies. While ubiComp is function-oriented and designed to improve modern life style, we intend to make the intelligent networked space emotionally responsive. We want to contribute to the development of our increasingly technology-infiltrated life-world, taking into consideration aesthetic, perceptive and critical aspects. The objective is to explore alternative ways of influencing our surroundings and to find out whether it is possible to recognize the moment when the surroundings take over agency. [7] The smallest alteration of algorithms and parameter values can turn a pleasant entourage into an omnipresent and manipulating data collector. For example: After a period of exploration a participant recognizes that his/her breathing pattern has direct effect on atmospheric changes like color and brightness of light of the surrounding stage. During the calibration process the system calculates average values and afterwards slowly turns from a real time biofeedback indicator into a guiding metronome. The question is: How far can this go before

the person in question realizes that his/her breathing pattern is being dictated by the atmospheric metronome?

MEDIA AND RESEARCH METHODS

Amongst other challenges we are exploring design principles and dramaturgic strategies for an affective-responsive physical environment. We will therefore develop an artistic experimental setting, an “epistemic installation,” to examine the immersion experiences of invited test persons. [8] It will be based on biofeedback sensing and spatial tracking technologies to capture affect and behavior of a person located in an atmospherically staged room. The person will be connected to the artificially composed space and parametrically influence light, color, sound, movement, etc. and will in turn be influenced by the surrounding atmospheric changes.



Figs. 7, 8. 2014, Christiane Heibach, Jan Torpus, Andreas Simon, hand drawings of possible spatial setups, © Jan Torpus.

Since connectivity with the involved person is to take priority over artistic expression, we will not work with a predefined script, but will develop the setting bottom-up, based on increasingly complex and multi-layered heuristic experiments. Breathing as a biofeedback input, for example, ensures that the test person can actively influence the setting upon recognizing the connectivity. Sooner or later, she will begin to breathe naturally, providing measurements that can also be analyzed in respect of regularity. We will gradually enrich bilateral sensor-actor scenarios so as to create more complex scenes with various parametric changes and affective response options in order to provide a full atmospheric experience.

While it is possible to measure and combine multiple data channels, strong and clear effects can already be obtained – as described above – based directly on simple, periodic physiological signals such as breathing or heart-rate. A well-researched example that demonstrates the possibility of manipulating direct feedback of a single physiological parameter is known as the “cognitive effect of false heart-rate feedback.” The false feedback effect, first

described by Valins, typically uses only auditory feedback – e.g. a beep to represent the heartbeat – to display a participant's heart-rate. [9] During the experiment this feedback is manipulated and test persons are presented with heartbeats that are faster or slower than the actual, measured heart-rate. By this false heart-rate feedback the test person's appraisal of his/her own psychological state is altered. A positive (amplifying) feedback loop on the actual heart-rate can be invoked, which can even induce anxiety and panic. [10, 11] The real change induced in the person's heart-rate is consistent with the hypothesis of a positive feedback cycle between anxiety and physiological symptoms. Invocation of anxiety in these experiments is evaluated through questionnaires and interviews and by obtaining measurements of the galvanic skin response.

The experiments described above were originally designed to investigate the coupling between two levels of emotional experience: phenomenology and awareness, exploring the hypothesis regarding the coupling between psychological / emotional states and their conscious appraisal (e.g. through the direct perception of physiological parameters).[12] What is interesting in this theoretical model and the corresponding experimental designs for our approach – that aims to control the perception of the environment through biofeedback – is that this invocation of a positive feedback loop on the physiological state of a participant is induced by a) transferring the perception of a physiological symptom to a direct external representation and that b) the feedback is triggered by introducing a manipulation of the display that does not reflect the actual, "true" physiological measurement. As previous research has mostly explored the effect of simple and direct auditory feedback, it is our aim to investigate more complex scenarios and interactions, such as the effect of dynamic, coupled feedback and the use of more complex and combined display modalities such as visual display or haptics. After basic experiments on human computer connectivity and with acquired know-how regarding multi-sensor and multi-actor systems, we will explore sensor-actor mapping optimizations, temporal sequencing and learning processes, buildup of narrative structures, metaphoric expression, creation of expectations, missions and surprises and hints for free imagination.

We apply evaluation methods from different scientific disciplines like ethnography and qualitative social research (observation, retrospective interview, think aloud protocol, video and audio recordings), quantitative analysis of the collected biofeedback measurements and recordings of the parametric systemic states. Furthermore, we triangulate the results as time-based tracks to be able to synchronize the atmospheric changes and the effects they have on the test person in one media document that can be evaluated.

COMPARISON OF ARTISTIC AND RESEARCH APPROACH

After describing a media art and an artistic research project addressing a similar topic, we would like to point out some differences

between the approaches and the potential of possible synergies. The products of media art projects are normally exhibits, like audiovisuals, installations, events or performances shown in virtual or physical exhibition spaces, at festivals or in public space. By creating them, artists or groups of artists want to make a critical statement, show something in its true light or simply tell a story or seduce the senses with aesthetic enactments. Besides creative satisfaction and artistic expression, the artistic credits are a crucial motivation. The addressees and quality managers of the artistic product are the cultured public audience and the critics and media reporting on it. The goal is to get a strong feedback, be it positive or negative, but the public resonance should ideally have a lasting impact. The process of artistic creation is definitely a process of studies and investigations, but normally it does not adhere to specific rules, methods or documentation processes. Serendipity, lucky failure, random composition and provisional knowledge are also useful components of the scientific lab, but in the artist's studio, where methods and strategies, analysis and synthesis can be adapted to new inspiration and insight at any given time, they find optimized conditions. This freedom of interpretation, composition and statement are valuable aspects that can inspire and dynamize methodologically restricted research processes. Unproven claims or simple fakes, which are common in the art world, can provide feedback from the public or specific target groups. The most classic approach for bringing art and science together is artistic representation of scientific results, which can be opinion-forming and improve both the commercial appeal and the educational value.

Research objects are normally not expressive or meant to entertain or confront a public audience, but epistemic or the product of solid analysis, knowledge and development processes. Their design is based on a model that directly follows a pre-formulated hypothesis and often appears stripped down and simplified. The desired response is ideally reduced to a single, causal relationship between parameters of the model that are measurable and that can be statistically interpreted. Often – and this clearly distinguishes it from an artistic goal – the subject/observer is not even aware of her reaction and performance with respect to the researched phenomenon.

Although researchers are equally interested in acknowledgment of their scientific work, they are rewarded for the documentation and text-based referenced publications of their findings in the respective communities, in particular when the later work of other researchers is directly based on their models and results. In commercially independent research a disproved hypothesis can be equally valuable as an approved one, because it excludes a viable approach in a standardized methodical setting. A promising approach from artistic research for the media arts is to renounce a precisely predefined script and to build the artistic implementation of the content bottom-up on experiments, ethnographic evaluations of audience feedback. This is especially valuable if the media artwork is based on novel interaction or media forms

with little existing public media literacy. In addition, an accompanying project analysis and documentation, which in the arts is often kept simple or left to the critics, can be useful for the development process and clarification of the artistic statement.

ARTISTIC OR SCIENTIFIC DATA VISUALIZATION

In interactive media arts it is a common approach to choose any real time data stream (e.g. position of transport system items, financial transactions, amount of electro smog, number of visitors in the local exhibition space, etc.) to develop a unique artistic display (virtual or physical) and an extraordinary interface or mode of user interaction to create a piece of art. Only after reading a longer artistic statement the visitor can recognize patterns and distinguish the sophisticated data visualization from a randomly created and purely entertaining audiovisual. This raises some questions: "How explicit should the context of source material and representation be and what makes a data visualization become art?" From the perspective of the sciences the question concerning data visualization is: "How poetically and entertainingly can information be treated and what is the added value for the sciences if public perception of it changes?"

Another critical distinction that is deliberately blurred in the presented artistic research approach lies in the difference between artistic and scientific motivation, in particular in the distinction between the subjective response and a participant's appraisal and the model-based, causal interpretation of a quantified, measurable effect. As we aim to evoke affective responses to our installations by experimenting with biophysical signals, we are bound to oscillate between two research modes: artistic impulse and a model-based instrumentalization of measurements.

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ART IN THE AGE OF NETWORKS

Cornelia Sollfrank, Sarah Cook, Duncan of Jordanstone College of Art, University of Dundee, UK; Felix Stalder, University of the Arts, Zurich, Switzerland

The panel 'Art in the Age of Networks' brought together outstanding experts in the field of digital networked art. Coming from various backgrounds (art practice, curating, network/media theory), the speakers discussed the changing notion of art and its relevance in a digital networked environment. Instead of taking a modernist approach and looking at media specificity, the panel focused on networked art in the tradition of the historical avant-garde understanding art as a forming element of society. The framing questions included: How can art contribute to building a new society? How can the values from free software be implemented in cultural production? How do artists contribute to building independent infrastructures?

Based on the assumption that art is not a fixed concept but rather continuously undergoes mutations as the result of permanent social negotiations and media shifts, the panel took a closer look at how artists today are dealing with the conditions of the networked society and what strategies they are developing to address them. The contributions complemented each other and offered a theoretical framework as well as relevant practice examples.

In his talk entitled "The cultural condition of digital networks," Felix Stalder examined the socio-technical transformation within digital networks and cultural practices adapted to these changing conditions. In particular, he focused on the fact that the number of potential cultural references has exploded. Billions of images, text documents, audio and video files of the most heterogeneous kind are available with relative ease through search engines, databases, shadow libraries and official repositories. Traditional cultural institutions – publishers, museums, archives and the like – are no longer capable of maintaining the boundaries between the "relevant" and the "trivial." This task has been generalized to everyone.

Also, artists respond to this scenario and they are reacting in two ways. One is to internalize in the work an ever-growing number of references necessary to make sense of the work; that is, their works are producing the context in which they want to be seen. In other words, the works become networks of references and relationships themselves. This was discussed by referring to the work *Là-bas* (2014) by the French artist Saadane Afif. The other way is that artists are focusing on the practices of selecting and relating directly by building platforms and institutions of all kinds that enable this practice to be oriented towards different goals. In the process, they are establishing cultural commons as resources for and destiny of, this kind of work that is seen as necessarily collaborative.

Sarah Cook continued by contributing an art historical and art theoretical perspective. She started with the reflection of a brief history of art and networked practices, from early net.art of the

kind produced by M.River and T.Whid Art Associates in the late 1990s, to when Simon Pope curated the group exhibition *Art for Networks* in the UK in 2004, to today and noted that it is key to understand what kind of network one is talking about. In contemporary art as well as in media theory, there would often be a confusion between what is just a network and what is more properly understood as a community. One way to overcome this problem would be to clarify what the purpose of the network is; after all, the network will only function as long as it has something to communicate.

In the following, Sarah Cook discussed a number of art projects that exemplify various artistic ways of dealing with the notion of the network. Works such as Nina Pope and Karen Guthrie's *A Hypertext Journal* (1994), a reenactment – with early blog – of a historic tour of the islands of Scotland, demonstrate the idea that a network might sit or build upon an existing platform for communication, such as the web or mobile telephony and might not even be digital. In her PhD thesis on socially engaged new media art, curator Ele Carpenter argued that:

"Different media platforms allow different scales of engagement and broadcast. Socially engaged art platforms are the located structure of localised activity, whereas new media art platforms are operating systems or programmes which enable participatory engagement or collaborative production over geographic distances. The characteristics of the platform determine which tools or systems are selected for a particular project." (Ele Carpenter, PhD Thesis, 2007).

This is evident in Graham Harwood's project *Coal Fired Computers* (2010) or the YoHa (Graham Harwood and his collaborators) project *Invisible Airs* (2011), which investigated the expenditure of Bristol City Council using the data found in the databases to run a series of contraptions which allowed users to experience the financial information physically. Both show how different audiences from varied knowledge areas can be brought into conversation about place, technology, agency and personal experience. As Graham Harwood has written of these projects, it may be that the artwork is itself a network:

"If we decide to follow a Simondonian logic and focus on how the artwork comes to be, how it individuates from its pre-existence and how this constructs its relations, then it is consistent that the work might exist simultaneously as a pedagogy, a campaign, an intellectual enquiry, software, hardware, an art object, network and process." (Graham Harwood, PhD Thesis, 2013)

Following this line of reasoning, sometimes the key thing artists can do is expose existing networks through their interventions or

contribute to the building of new networked infrastructures by raising questions about existing infrastructures – modifying, hacking and re-scaling them.

Cook's central argument was that artists working with networked technologies demonstrate that there is a potential for understanding art as an agent for social and political change, on the basis of their employment of digital networked technologies. She ended by stating that in the case of artists engaging in networked technologies there is potential for a greater shift from consumer to producer, from user to developer, from thinking of technology as a tool to considering it as a way of engaging with others about the shared concerns of living in a digitally networked environment.

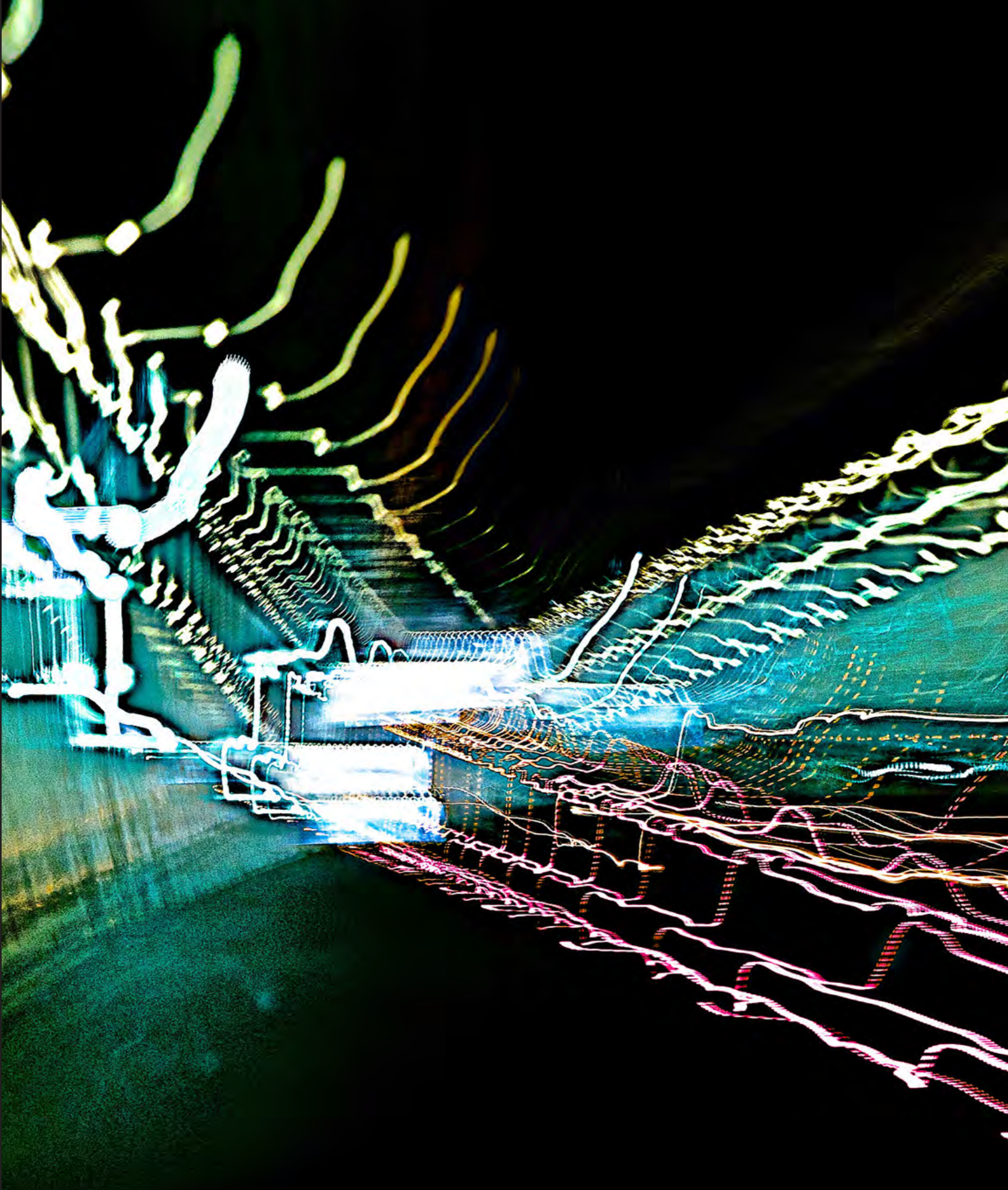
Relating to Stalder's thesis that the overflow of information, the overflow of ambiguous references and the failure of conventional ordering systems opens up two possible ways for artists of dealing with the situation – the creation of individual reference systems and individual systems of meaning on the one hand and what he called "the archive strategy" – the opening up of a new potential of reference systems by building 'meta structures,' on the other hand. Cornelia Sollfrank's contribution clearly provided examples for the latter.

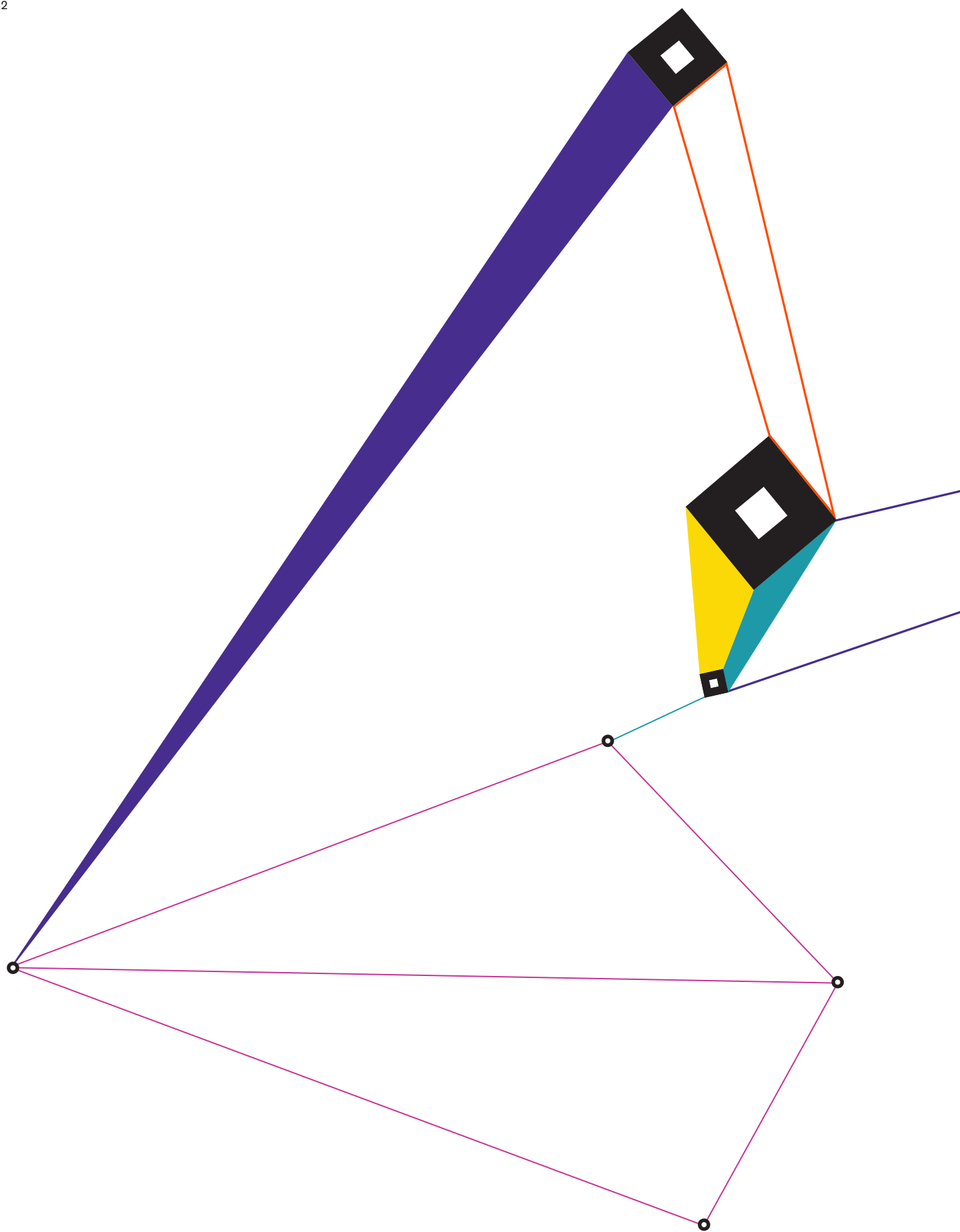
In her ongoing artistic research project 'Giving What You Don't Have,' in which Sollfrank explores the relationship between art and the commons, she puts a special emphasis on artistic projects that create meta structures and new ordering systems such as archives, communities and platforms as well as various devices. Under the subtitle 'Art as Infrastructure/ Tool/ Service,' Sollfrank screened excerpts of filmed interviews she did with artists and used the material to discuss a number of questions. The projects she introduced in more detail were UbuWeb and Libre Graphics.

UbuWeb is an online repository of avant-garde art created by NY-based poet and writer Kenneth Goldsmith. UbuWeb is a massive collection of what Goldsmith calls avant-garde art, comprising thousands of works of concrete poetry, sound poetry, sound art, experimental film, multimedia archives, video, dance and a variety of other genres and formats. All works can be viewed online and downloaded. The archive is running on zero budget; there are simply no resources for copyright clearance procedures. Thus, UbuWeb is as much about the legal and social ramifications of its self-created distribution and archiving system as it is about the content hosted on the site. Also aaaaaarg.org is an open source platform for freely sharing content: books and texts. The repository includes media theory, philosophy, art history and theory and architecture and has been created as a working tool for the Public School – a self-organized educational project which started in LA in 2007 and now has branches in 12 cities all over the world. aaaaaarg.org is the central tool for the creation and sharing of knowledge within Public School and produces project-related communities around their reading material. The interest of the creators of the project primarily lies in the appropriation of systems

and structures – such as gallery, library or school – rather than simply content. The last example presented by Sollfrank was the work of Belgian artist Femke Snelting, who develops projects at the intersection of design, feminism and free software, thus investigating the intimate relationship between form, content and technology or more specifically the interrelations between digital tools and artistic practice. The ecosystem the artist is working in is called Libre Graphics and consists of graphic designers, programmers, free software tools, open document formats and practices of sharing and reflecting which applies the thinking and philosophy of free software to graphic design practice. Art, here, comes into play as a reference system for integrating practice and discourse beyond the usability paradigm.

General questions for the discussion following the presentations were derived from this last research project by Sollfrank but were applied to networked art in general: Do the artists use symbolic means/forms to address the issues of the networked society or do they create actually functioning forms/units, such as archives, platforms and communities? What do these different approaches represent in terms of concepts of art? Do the various projects suggest new forms of organization or new models for the circulation and distribution of knowledge? What forms of social relations do they enable/activate/produce? What role does technology play? Is it an integral part of the works or is it the theme? What forms of agency do the projects exemplify? The discussion of these questions was eventually connected to the underlying idea of understanding art as an agent for social and political change on the basis of digital networked technologies.





STREAM 3

PERFORMANCE



A DIFFERENT ENGINE

Nigel Helyer, Sonic Objects, Sonic Architecture, Western Australia

ABSTRACT

A Different Engine is a kaleidoscopic look at the origins of the digital, driven by pattern making in textiles and music. The paper examines the historical exchange of concepts, images and technologies between East and West via the overland and maritime Silk Trade routes. The paper will reference the importance of the Arabic traditions of Astronomy, Mathematics and Navigation, showing how these facilitated this trade, as well as prompting the Renaissance in Europe. By employing the metaphor of pattern making and the weaving of fabrics traded along the silk route, the paper will examine the provenance of computer control which can be traced to the early industrial practices in textile production, where loom operating instructions were encoded as a series of punch cards – in essence ‘digitizing’ weaving patterns in Jacquard looms.

The virtues of this novel punch card system were not lost on Charles Babbage who adopted them to drive his *Difference Engine*. From there they were rapidly adapted to automate mechanical music devices, the punch patterns becoming, in effect a form of graphical score capable of sequencing music boxes’ barrel organs and later Pianolas. By virtue of being able to not simply encode musical pitch but also performance characteristics, the Pianola (or Player Piano) was the most sophisticated manifestation of this development and in terms of reproduction quality was far superior to the nascent technologies of audio recording and transcription, such as the Edison Wax Cylinder or disc based Phonography. Ironically it was the punch card and subsequent punch tape technology that enabled the birth of the modern computer and its entwined history with music. The first public performance of computer generated music was demonstrated at the Australian Computer Conference in 1951 by a team from CSIRAC (council for Scientific and Industrial Research Automatic Computer) who fed their massive computer with spools of punched paper.

Three Thoughts about Code.

SIGNAL AND NOISE – DISAMBIGUATION

Echo’s cries rehearse the utterances of others, departing as counterfeits without significance, returning diminished and disembodied – orphaned sounds. Narcissus swoons as he reaches out to caress the face that has him bewitched. As his fingers touch the perfect image it transforms into an animated mandala, formed of concentric algorithms far more complex than his melancholia. Smoke curls up from Beacon Hill and is answered in the distance by another and yet still another. A King has died, an Armada has breached the horizon. In every case a presaged message is unleashed – only the timing is significant.

Stepping forward through the logic and logistics of the Enlightenment, writing ousts memory and unlike the transient

voice, it has the ability to transpose and transport itself – it flies and it endures. But like everything it is subject to the 3rd law of thermodynamics, its clarion voice fading with distance. Poured into channels of Copper or sparked into the Ether language swims in an Ocean of Noise in constant fear of corruption, desperate for disambiguation. The message is quantized, fundamental particles taking the form of semaphore flags, dots and dashes, the texture of Braille. Speech and spelling are rehabilitated as military jingo-jargon, Alpha, Bravo, Charlie.

DISTANCE AND TRUTH – COMPRESSION

It is one thing to speak with clarity and be heard over distance (or perhaps even time) but it is another to say a lot and say it fast. The goal of Telematics is to be coherent and robust, economical and fast. Our thoughts, already expressed as serial icons or codes, are now to be compressed into a form that is both necessary and sufficient for the purpose. Lacking a written language and acknowledging the frailty of memory the ancient Peruvians developed the Quipos, delicate arrays of twisted and knotted threads encoding vital communal information. Marconi abbreviated standard business procedures to save bandwidth and Mawson, who established the first radio communication from Antarctica compressed the limited range of explorer narratives into a code-book, “R-776” meaning I have grown a beard for example. The compression of meaning and emotion is recirculating today in the form of emoticons, happiness a single condition reduced to a smiling PacMan.



Fig. 1. South American Quipos, Anon.

KNOWLEDGE IS POWER – ENCRYPTION

Sensitive messages have always been jealously guarded to ensure their privacy and security, never more so than in times of conflict. However, the air, airtime and airspace are open and

permeable, available and exposed, as are the transmission technologies which propagate them. The solution to such vulnerability is encryption, the rendering of the unambiguous and compressed into a cryptic form, publicly flaunting itself but impenetrable without a key.

The *Romeo Alpha Foxtrot* (Royal Air Force) held back whilst the Luftwaffe destroyed the city of Coventry in order not to give the Enigma Machine code breaker's game away, a sacrifice that subsequently sealed the demise of the Afrika Korps through intercepted intelligence and also initiated horrific reprisal raids on Dresden. Across the Atlantic, US army communications were conducted in the unique and modern alphabet of the Cherokee Nation – a tongue difficult for the enemy to acquire. In London, at the outbreak of hostilities the BBC panicked over the real possibility of Oxbridge trained upper-class Germans broadcasting ersatz programs in perfect King's English. Their solution was to install Wilfred Pickles as the voice of London Calling. Pickles, a Yorkshireman broke the mould of BBC voice types, with his broad northern accent, impossible even for a Home Counties resident to copy or perhaps understand, in this instance encrypting not the message per se but the vector of delivery.



Fig. 2. Wilfred Pickles.

A Different Engine – Vignettes of the Ur-digital.

THE SWITCH

Arabia played a fundamental role in connecting the Orient and the Occident via the braided routes of the Silk Route caravans. These physical pathways also created circuits for the transmission of ideas, technologies and products between East and West. Arabia was also the focal point of marine trade routes plying between China, India and Europe, where the mathematical and astronomical skills of Islamic navigators took pride of place on Chinese treasure fleets. Viewed in this context Arabia played the role of a gatekeeper of knowledge, rekindling the fires of inventiveness and philosophy in Europe after the deep sleep of the Middle Ages. The Silk Route becomes a resonant metaphor, a vast entwined network of dusty desert road and sparkling blue sea-ways, the careful and laborious haulage of precious commodities, all manifestations of luxury embodied as silk. But what in essence is silk? – a flow of pattern, a flow of intertwined fibers carrying symbolic memories, technological memories and the physical traces of intensive human labor and skill.

TEXT

Silk is text and text is the keeper of memory and knowledge. The Latin to weave is *texo*, more broadly to twine together, to plait, to construct and to build. *Textere* is to compose whilst *textus* is texture. We carry on spinning yarns, knitting our brows, sewing things up and weaving tales. We weave webs of lies and fabrications. The text is a fabric and fabric is a text that travels on the back of a camel across the dunes and rides the swells in the South China Sea.

MEMORY MACHINES

Her hands moves, slowly but inexorably to hover above the keyboard, then gently release to work the keys and the first notes rise from the Organ. She does this perfectly and always with an inscrutable expression. Of course this is the only thing she can do, she is a memory machine, an early automat built between 1768 and 1774 by the Jaquet-Droz family in Neuchâtel. She is remarkable in that she does not mime to an encoded music (i.e. a hidden music box) but she holds in her 'memory' the actions of performance, the movements of head, eyes thorax, arms and digits on the fully functional keyboard, she is a true android performer.

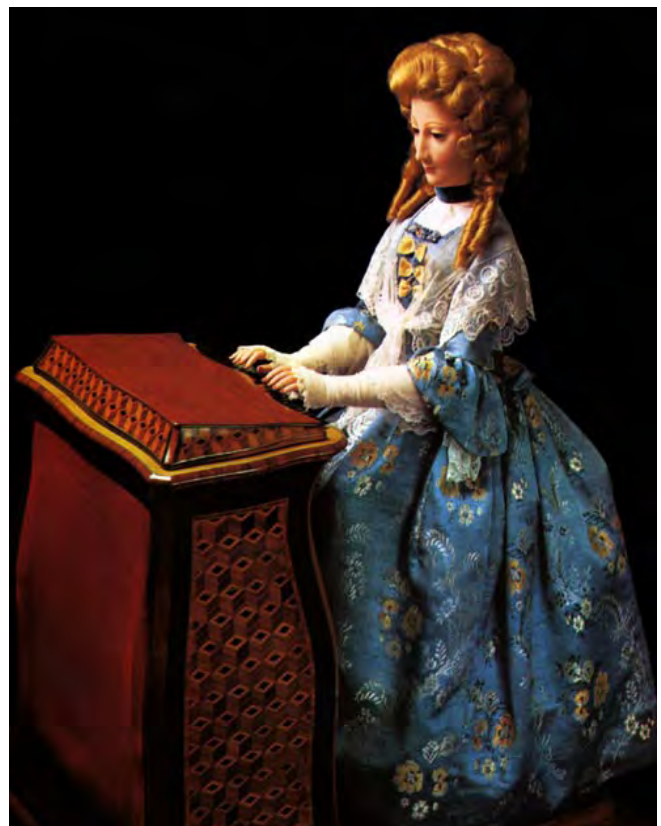


Fig. 3. Jaquet-Droz mechanical musician.

BASIL BOUCHON

Basil Bouchon was as fascinated by these early clockwork musical automata as he was worried by the fierce competition in the Silk trade, where the genuine article (silk from China) was still cheaper

than his Lyon based silk factory could produce. Indeed his looms were based on the Chinese two person draw bar system which demanded a skilled and fallible “draw-boy” to set the complex patterns. Bouchon, determined to modernise and eliminate his overheads, began to experiment with a mechanism that employed punched paper rolls to control the loom patterns. Bouchon only ever managed a proof of concept, but his experiments were not in vain. His paper roll system was taken back into the world of music to eventually become the pianola (Player Piano). More importantly they sparked the imagination of another master silk weaver from Lyon, Jean-Marie Jacquard.

JEAN-MARIE JACQUARD

Jean-Marie Jacquard developed Bouchon’s concept into a robust system that employed chains of perforated cards (one card for each operation of the shuttle – with up to 30,000 individual cards for a single design). This eliminated the second person on the loom (the ‘draw boy whose task it was to laboriously select the warp threads) making European looms more competitive with Chinese hand operated machines.

This technology revolutionized weaving but at the same time caused massive social labor disruption (akin to the more recent digital revolution in news and publishing), but most importantly the technological system for encoding information diffused into other areas. It was not long before the idea of encoding pattern and/or numerical data was taken up by Babbage¹ in England (1822) and later by Hollerith² in the USA (1889 onwards).

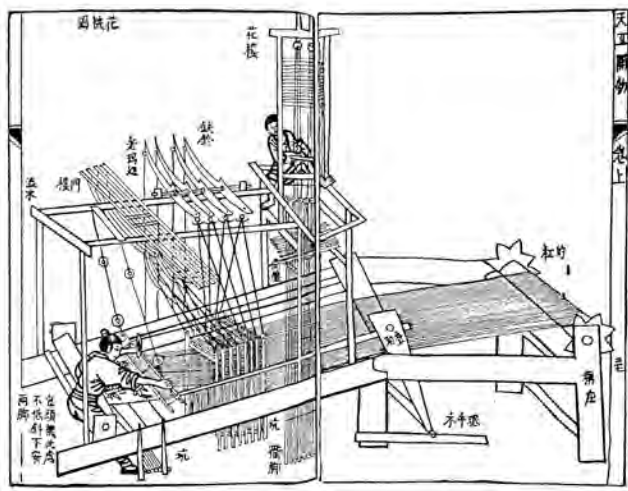


Fig. 4. Traditional Chinese drawbar silk loom.

PLAYER PIANOS, MICROPHONES AND GLENN GOULD

But let us not lose the musical thread so quickly. The Player Piano (Pianola) differs from the Piano, from sheet music notation and from a recorded performance in that the smooth rolls of punched paper and the associated pneumatic vascular system not only encode the music but also the performance values (the precursor of MIDI). Such encoding of content and delivery is reminiscent

of Glen Gould, that irascible Canadian virtuoso, who held rehearsal in disdain and wasn’t too keen on performing in public. Gould much preferred the recording studio and could be said to have a love affair with the microphone (and of course the subsequent editing process) the technically manipulated results of which, made his recorded performances for the CBS quite outstanding but possibly impossible to match in a live context.

THE DARK SIDE

Like Nature, digitization is indifferent – it can be applied anywhere and anyhow. Hermann Hollerith submitted his PhD thesis “An Electric Tabulating System” to Columbia University in 1889. He was subsequently employed by the US Census Department at the end of the 19th century to develop an efficient census evaluation system. In 1896 he founded the ‘Tabulating Machine Company’ which later merged to become IBM in 1924. In 1910 the Deutsche Hollerith Maschinen Gesellschaft began operation in Berlin under license from Hollerith. We can picture Herr Doktor Korherr loading a batch of census cards into the Hollerith Machine. In the year 1939, the National Socialist Census Office perfected a system to capture the biological make up of each family in the German Reich. We all know the outcome!



Fig. 5. Poster for the Deutsche Hollerith Maschinen Gesellschaft.

A REPRISE

To recap – the provenance of computer control was originally devised as a sequence of punch cards, encoding weaving patterns to operate industrial revolution Jacquard looms.

The virtues of the punch card system were not lost on Charles Babbage who adopted them to drive his Difference Engine and they were rapidly adapted to automate mechanical music devices, punch patterns becoming, in effect, a form of graphical score capable of sequencing music boxes' barrel organs and later Pianolas. The Pianola or Player Piano, was the most sophisticated manifestation of this development and in terms of reproduction quality was far superior to the nascent technologies of audio recording and transcription, such as the Edison Wax Cylinder or disc based Phonography, by virtue of being able to encode, not simply musical pitch but also performance characteristics.

It was textile and musical patterns manifest as punch card sequences that enabled the birth of the modern computer and entwined its history with music. The first public performance of computer generated music was demonstrated at the Australian Computer Conference in 1951 by a team from CSIRAC (council for Scientific and Industrial Research Automatic Computer). The CSIRAC fed upon spools of paper punch tape. The world's first true computer, COLOSSUS was installed in 1944 at Bletchley Park for cryptanalysis of the German Geheimschreiber, an in-line cipher teletype machine. This was followed closely by ENIAC, a US military, numerical integrator and computer used to calculate ballistics and the Atom Bomb. But on the side of light, we have CSIRAC 1951, the first public performance of Computer generated music, Sydney.

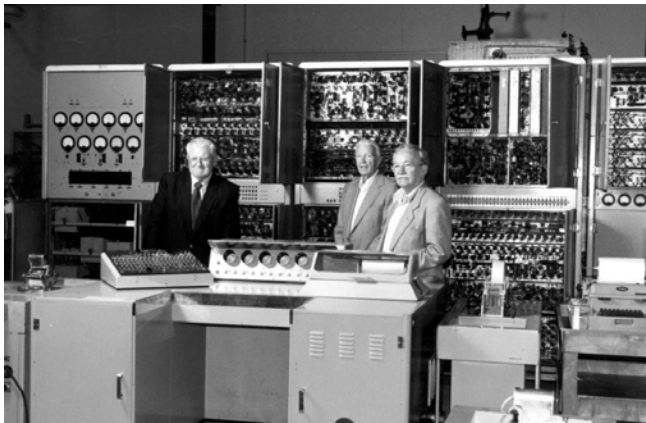


Fig. 6. CSIRAC in Sydney, 1951.

Some thoughts about Codes and Life – Joe Davis (Malus Ecclesia) and Nigel Helyer (GeneMusik). As an end-piece let us consider that other revolution in encoding discovered during the twentieth century, DNA. In 2003 artists Joe Davis and Nigel Helyer exchanged a series of ideas for encrypting information in DNA, Davis pursuing textual codes and Helyer musical. At that time Helyer, working under the aegis SymbioticA,

collaborated with the School of Agricultural Science (University of Western Australia) to develop a proof of concept designed to translate music into DNA which when inserted into bacteria was able to be re-mixed and subsequently extracted and decoded into novel musical forms.

Fast-forward eleven years and Davis is en route to realizing his Malus Ecclesia project at the Harvard Medical School. Davis plans to transpose the fount of all human knowledge, Wikipedia (sic) within the junk DNA of an ancient strain of Apple. Malus in Latin represents both Apple and Evil (whereas Ecclesia refers to Church and pays homage to George Church, the Harvard Professor with whom Davis is working). In this reprise of the Garden of Eden scenario, Davis will ultimately fill a grove with grafted apple trees which will presumably contain all branches of Knowledge. However the apples may be covered by an indictment on consumption, this time not by Jehovah but by the US food and drug administration!



Fig. 7. Drs Helyer and Albertyn at the UFS Microbiology Lab, Bloemfontien SA with GeneMusik bacterial cultures.

In a similar manner Helyer has nurtured his interest in the parallelism between Genes, Memes and Musical Notation as mnemonic structures capable of evolution and the embodiment of memory. In 2014 GeneMusik rides again to create a re-mix of cultural, social and biological pathways. Working in South Africa with indigenous musicians GeneMusik hybridizes local ethnic music with the epitome of the western musical tradition, the string Quartet, via the transformations of musical and genetic codes within bacterial cultures. Musical patterns of the indigenous San peoples are genetically transformed to infiltrate the formal notation and performance values of western art music.



Fig. 8. Drawing of a San Bushman playing the Gorah with musical annotation, from *Travels in the Interior of Southern Africa*, Burchill.

A THOUGHT ABOUT SOUND AND LIFE – UNDER THE ICECAP

And a final thought about data. Under the IceCap is a long-term collaboration between Artist Nigel Helyer and Marine Scientist Dr. Mary-Anne Lea at the Institute for Marine and Antarctic Studies, University of Tasmania (Hobart).

In a nut-shell the project team renders complex environmental bio-logging data-sets collected by Southern Elephant Seals³ on their extended under-ice dives and long open ocean transits into 4D cartographic animations, sonifications and graphical music scores, which are used to generate live public performances. Our decision to interpret environmental data via an aural process is based upon a hunch that musicians have the best pattern-recognition 'wet-ware' around and that our aural sensibility is in fact more finely tuned to detect variations in pattern and recognize subliminal differences, than our visual sense.

The byline for the Institute of Marine and Antarctic Studies is *Turning Nature into Knowledge*. The Under the IceCap project supplies a second line *Turning Knowledge into Culture* encapsulating a powerful Art and Science synthesis. The primary aim of the project is to produce creative work which is compelling

and affective but which is simultaneously a work of scientific utility hopefully tapping into both sides of the brain! The key focus is to illuminate the relationship of the environmental knowledge generated from Antarctic bio-logging data with the Anthropogenic changes in the biosphere.



Fig. 9. Elephant Seals with BioLogging device.



Fig. 10. Under the Icecap live performance with data-visualisation screen shots.

ENDNOTES

1. Babbage, The Difference Engine (1820's to 1860's) 1822 paper "Note on the application of machinery to the computation of astronomical and mathematical tables" funded by the British Government. Essentially a mechanical (hand cranked computer).
2. Hollerith, An Electric Tabulating System (1889) Columbia University PhD thesis – data tabulation. Founded the 'Tabulating Machine Company' which later merged with IBM. Basically an electrical data tabulation system employing punch cards built under contract to the US census department – later used by the National Socialists in Germany prior to and during WW II.
3. Southern Antarctic seals can dive to 2000 metres, stay down for 2 hours and make ocean transits of many thousand kilometers.

A RELATIONSHIP BETWEEN THE INTERNET AND THE PHYSICAL FOR THE ART

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ABSTRACT

In *The Aesthetics of Net.Art*, Julian Stallabrass described, "The 'objects' of Internet art are far from being conventional art objects. They are not only reproducible without degradation but are almost free to transmit." This point is concerned with the immateriality of art. The immaterial nature of the Internet throws the art world into confusion. I want to show the confusion of art from the viewpoint of the relationship between the Internet and the physical. I will examine three cases: *Send me the JPEG* by Winkleman Gallery, *DISOWN* by DIS, the Internet Yami-ichi by IDPW. I will conclude that *Send me the JPEG* by Winkleman Gallery shows the complexity of the dichotomy between the Internet and the physical. *DISOWN* by DIS overcomes the confusion of the dichotomy between the Internet and the physical and transforms the crossing of the two into the Post Internet value. The Internet Yami-ichi by IDPW makes a lot of jokes about the confusion of the dichotomy between the Internet and the physical and reframes an outside of the overlap between the two. Consequently, the Internet-ish is downloaded and installed in reality.

INTRODUCTION

In *The Aesthetics of Net.Art*, Julian Stallabrass described, "the 'objects' of Internet art are far from being conventional art objects. They are not only reproducible without degradation but are almost free to transmit (or rather, once the initial outlay has been made, the marginal cost of each transmission is close to zero). Cheaply reproducible artistic media have long existed, of course, but attempts at their wide dissemination have foundered on the cost of distribution. [1] This point is concerned with the relationship between the Internet and the physical art. The Internet can show artworks as almost perfect copies anywhere because of its immaterial nature. However, the contemporary art that was based on the physical is rapidly acquiring an immaterial nature and widely stepping on the Internet. The immaterial nature of the Internet throws the art world into confusion.

THREE CASE STUDIES

Stallabrass described online art almost ten years ago; nowadays, a relationship between the Internet and the physical art is becoming more complicated. In order to show this complicated situation, I will examine three cases: *Send me the JPEG* by Winkleman Gallery, *DISOWN* by DIS and the Internet Yami-ichi by IDPW.

SEND ME THE JPEG BY WINKLEMAN GALLERY

In short, *Send me the JPEG* seeks to question what is gained and what is lost in this new era of collecting. The increase in accessibility and the flow of information have eliminated the formerly formidable geographic obstacles that made it difficult to disseminate images and ideas. An attendant rise in the amount of capital being devoted to the production and display of

contemporary art has made it possible for more artists than ever before to exist. These have to be seen as positive. By the same token, the basic relationship between viewer and object has been fractured. Indeed, in this new order, the way a work looks in a photograph (even if it is itself a photograph) trumps all other concerns, which has affected what is made, as well as how it is contextualized. "Disruptive technology" is well named and one must adapt. Ultimately, though, we trust that *Send me the JPEG* is an argument that there still is value in experiencing new work in person. [2]

Winkleman Gallery's statement implies that not only the online art, but also the traditional art world is getting to adopt the immaterial nature of the Internet. The paintings, sculptures and installation arts are transformed into the intangible JPEG images in order to spread them all over the world. As a result, many art collectors watch the almost costless JPEG image and buy the actual artwork. Over half of contemporary art collectors purchase an artwork at a glance of its digital image without actually seeing it on the gallery. According to Winkleman Gallery, it is "very excited about the reach that digital opportunities offer to promote our artists outside the gallery space itself, but we're a bit skeptical that the rise in the number of collectors who have purchased some art from JPEGs indicates any dramatic impact for the future of "the physical experience." [3] Nearly perfect immaterial copy of the actual work invades "the physical experience" of the art collectors. In order to inspect this situation, Winkleman Gallery held a gallery's artists group show *Send me the JPEG* in 2013. *Send me the JPEG* exhibited not actual works but digital images of works on large flat monitors. We go to the real gallery in order to watch the physical artwork; however, Winkleman Gallery displayed only digital images of the works.

Send Me the JPEG asks us what the significance of the physical space is. The Internet shakes the value of the real space for the art world. Only the real space can show the physical artworks; however, this value in experiencing artwork in person is held in doubt by the Internet. The Internet becomes another exhibition space for the gallery beyond the geological gap; therefore, the gallery space is not an absolute one. As a result, the Internet compels the gallery to rethink how important or not its own real space is. *Send me the JPEG* seems like throwing out its physical space for the actual artworks; the physical space becomes like the Internet, but the gallery space still bonds to the geographical condition.

From 1990s to 2000s, the real space has had overwhelming value against the Internet in the art world. In 2010s, the traditional art has become similar to the net art in terms of spreading itself through the Internet. Consequently, many art collectors regard

the immaterial JPEG images as the actual artwork for making a decision to buy it and the physical gallery place becomes equal to or subordinate to the Internet. Furthermore, *Send me the JPEG* attempts to bring the JPEG image working as the actual artwork on the Internet into the physical space. Winkleman Gallery's experiment shows a subversive relationship between the physical artwork and the immaterial JPEG image. It means that formerly, the Internet belonged to the physical; today, the physical belongs to the Internet.

Is this situation good or not for the art gallery? People almost think that the real is more important than the Internet. But Winkleman Gallery says: "This is a fantasy group exhibition. We could never actually present all these works in our space at the same time." [4] The JPEG image brings its advantage point of the huge Internet space into the physical space, as well as its disadvantage point of the lack of "the physical experience" in the gallery space. In short, the art galleries have not yet fully addressed these negatives and positives.

DISOWN BY DIS

"*DISOWN – Not For Everyone*," is an art exhibition posing as a retail store. Or maybe it's the other way around. As Karl Lagerfeld for H&M is a diffusion line for fashion, *DISOWN* is a diffusion line for art. Set as an examination of taste and consumerism, *DISOWN* presents a new model for cultural critique. Presenting products from over 30 world-renowned artists including Ryan Trecartin, Jon Rafman, Bjarne Melgaard, Amalia Ulman, Telfar and Hood By Air (HBA), *DISOWN* will be featured in a retail installation by artist Lizzie Fitch. Art collective DIS and curator Agatha Wara present the month long exhibition, starting March 6th at Red Bull Studio New York. [5]

A New York-based collective, DIS represents Post Internet value by publishing the online platform DIS magazine. "Post Internet" means there is no difference between the Internet and the physical world; everything is Internet! Although DIS is mainly active on the Internet, this corrective does not matter whether it is the real and the Internet. For example, DIS held *DISOWN* at New York's Red Bull Studio and will curate 2016 Berlin Biennale. In the physical and the Internet, DIS attempts to diffuse the Post Internet value all over the world, but it is not for everyone.

As shown by the prefix of "dis-" that is their group name, DIS will continue to criticize the existing hierarchy and power. The word "Internet" usually indicates the negative aspects such as "an inferior space to the real" and "a place of pranks," however, DIS use the "Internet" as the indulgence in order to criticize the traditional values scathingly. DIS does not simply deny the values of the past, but takes the way of relativizing the absolute real value via the Internet. They keep criticizing the traditional values via the Internet and gradually overwrite the overlapping area between the real and the Internet into the Post Internet that means "dealing with the real and the Internet as the equivalent." Finally, DIS hopes

to create the relationship that both the real and the Internet are not in either of the alternatives. There is just Post Internet.

DIS tests Post Internet value in everywhere in order to diffuse it. For example, *DISOWN* is a "retail platform and laboratory to test the current status of the art object." [6] Gabby Bess, a multi-media artist, says, "The show cleverly illustrates DIS' ethos of wanting to disrupt existing hierarchies in the art world and to work outside of traditional art economies." [7] *DISOWN* opened as an exhibition using the format of a retail shop in the physical space; now, it has become an online store because the form of real retail store is very limited geographically and temporally. *DISOWN* imported the Post Internet value into the physical place and made the strong impression on the traditional art world and it has gone back to the Internet in order to diffuse the Post Internet continuously. This strategy implies that DIS considers the Internet as not an ends but just a means of the diffusion of the Post Internet value. DIS makes full use of the Internet in order to keep on overwriting everywhere into the Post Internet value.

DISOWN plans to make another circulation system of artworks. Each artist, like Ryan Trecartin, Jon Rafman, Amalia Ulman and more, puts his or her feeling of artworks into the goods on *DISOWN*. And furthermore, stocks of *DISOWN* are sold from \$30 to \$4,800 and are cheaper than their artworks in the gallery. Therefore, a relationship exists between the gallery and *DISOWN* where the artwork in the gallery is given priority, rather than what's best for *DISOWN*. Is *DISOWN* just a diffusion line of the traditional art world?

It is little wonder that the goods on *DISOWN* are sold at more expensive prices at the art gallery. Even though the artists who represent post-internet value show and sell their artwork in the traditional art world, they collaborate with DIS to make another art commerce system (*DISOWN*). Moreover, it is interesting that both post-internet artworks and *DISOWN* stocks are under the strong influence of the abundant copy-and-paste images on Tumblr. If we examine the art world from the point view of Tumblr, we might say that first, there are free images on Tumblr and next, the images become the expensive artworks such as the Tumblr images in the gallery. Finally, they change the reasonable prices for good artwork, such as those shown on *DISOWN*. This circulation of image-art-good blurs between the artwork and the good. Besides, it makes the overthrow of the relationship between the traditional art world and the Internet; the art world is no longer first; the Internet is first and everything is the Internet! DIS creates a new place like *DISOWN* with Post Internet artists who play trickster in the traditional art world, which heightens and spreads Post Internet value in both the physical and the Internet.

DIS examines the Post Internet on the Internet or the real space and uses the Internet to revolt against art. The dichotomy between the physical space and the Internet is shifting to another dichotomy between the traditional and material art world and the Post Internet

value that represents the immaterial culture. DIS does not care whether their exhibition is held in the physical space or the Internet because they only hope to spread the Post Internet value. Using both the real and the Internet, DIS attempts to popularize the Post Internet value as the diffusion line of the traditional art as much as they can. As a result, the diffusion line will get more crucial presence than the correction line, the traditional art. DIS will make a new order of the art world via the Post Internet value that comes from the Internet.

Although *Send me the JPEG* by Winkleman Gallery shows an ambivalent feeling for the immateriality of the Internet, DIS straightly represents and uses it for the Post Internet value. DIS not only overcomes the confusion of the art world caused by the ambiguous intangible nature of the Internet, but also uses its nature in order to diffuse the new order-based Post Internet value, *DISOWN* online store. DIS shows the entirely new value beyond the dichotomy between the physical space and the Internet and asks us whether you can keep up with us and the Internet; therefore, *DISOWN*'s slogan is "Not For Everyone."

THE INTERNET YAMI-ICHI BY IDPW

Stuff happens. Didn't used to. Like when some small off-handed private comment turns into an SNS flame war. Or worrying about not getting enough "Likes." The YouTube videos you can't watch anymore because somebody complained. Or the apps you can't play because they were rejected by Apple. Once upon a time, the Internet was supposed to be a place for "liberty." Nowadays it's so uptight.

So let's turn off, log-out and drop in on the real world. The Internet Yami-ichi is a flea market for "browsing" face-to-face. Take your own Internet liberties* here, with us.

*But no dangerous or illegal goods, please! This black market wants to remain free and useful! [8]

The Internet Yami-ichi (Black Market*) is a flea market which deals with "Internet-ish" things, face-to-face, in actual space. Both flea markets and the Internet are fanatical and chaotic mixes of the amazing and useless. In the Internet Yami-ichi both the wills and desires which brought us to create the Internet and the wills and desires we picked up once we got there are salvaged to be shared in a social space. Together we experience the afterglow, off line, as the "buzz" of the Internet wears off.

*The Japanese word "Yami-ichi" translates directly into the English "black market," though due to an emphasis created by mixing different Japanese writing systems the word "yami" takes on double meaning of "sick for" / "addicted to" etc., so a more accurate translation might be "Internet Obsessives Market." This market doesn't trade in dangerous or illegal goods. This black market is bright! [9] IDPW, a secret society on the internet since 1914 (it's a joke!) and the organizer of the Internet Yami-ichi,

evaluates the value of the real place via the Internet and makes use of it as a landing place for the "Internet-ish." Therefore, the relationship between the Internet and the physical space is twisted on the Internet Yami-ichi. There is no big art market and art world in Japan as in America and the EU; IDPW does not need to criticize the art world as DIS does. Consequently, IDPW can focus on examining the relationship between the Internet and the physical space and hacking both the Internet and the physical space.

There is no dichotomy to turn over each other for art on the Internet in Japan. There is only blank and marginal space waiting for someone to overwrite its status. IDPW transforms the blank space into a place where the spirit of the Internet is summoned. Members of IDPW and participants of the Internet Yami-ichi sense that the Internet is there, even when they log off from it. Tomoya Watanabe, a member of IDPW, stated: If the Internet is shut down I'm OK. I have the Internet on my body. The Internet is everywhere if you have the Internet-ish sense. I think a handshake is the Internet-ish sense and signal fire is like Poke. If you have the Internet-ish sense, everything becomes the Internet. [10]

Watanabe is sure that we have the Internet-ish sense on our body even though we log off from the Internet. Here, we have to make clear what "the Internet-ish sense" means. The Internet-ish sense represents not the current Internet but the early web. iMAL, a host of the Internet Yami-ichi 5 Brussels, describes, "The Japanese collective IDPW.org invites us to perpetuate "in real life" the freedom and joyful anarchy of the early web." [11] IDPW trust in not the Internet but the Internet-ish sense that represents "the freedom and joyful anarchy of the early web." IDPW adopts the flea market for describing its feature of the Internet Yami-ichi. IDPW explains "Both flea market and the Internet are fanatical and chaotic mixes of the amazing and useless." iMAL says, "the Internet Yami-ichi draws its inspiration from flea markets, these chaotic assemblages that combine hidden gems, unlikely objects, collectibles and useless trash." [12] The phrase, "these chaotic assemblages," is an accurate description of the Internet Yami-ichi. The format of flea markets unexpectedly let the Internet Yami-ichi link with the art world because Nicolas Bourriaud considers that "The flea market" is a representative format of the dominant art for the nineties.

Why has the market become the omnipresent referent for contemporary artistic practices? First, it represents a collective form, a disordered, proliferating and endlessly renewed conglomeration that does not depend on the command of a single author: a market is not designed, it is a unitary structure composed of multiple individual signs. Secondly, this form (in the case of the flea market) is the locus of a reorganization of past production. Finally, it embodies and makes material the flows and relationship that have tended toward disembodiment with the appearance of online shopping. [13] The Internet Yami-ichi is a place for the reorganization of the early web spirit, creating new meaning for

the Internet. IDPW does not think that the real is better than the uptight current Internet, but the real is more similar to the early web than the current Internet. Therefore, they have reorganized the past Internet into the Internet-ish sense in order to combine the real with early web minds. Unlike Bourriaud, who considers that its disembodiment is negative for the real space, IDPW embodies a positive face of 'disembodiment with the appearance of online shopping' on the physical space. As a result, IDPW hacks both the Internet and the physical space.

Shunya Hagiwara, a member of IDPW, states: "The Internet Yami-ichi recognizes the Internet as a character. It is like making a derivative story of the Internet." IDPW makes a new story for the Internet as a character. The Internet does a very good job in the new story, which are different times and space from now and here. Hagiwara's idea shows how making a derivative story with the Internet as the character can be one of the hacking ways. First, IDPW tries to find the blank space between the Internet and the physical; second, they hack and overwrite the blank in order to make another story of the Internet. Finally, the Internet-ish sense is summoned to the blank space with a new story; then the Internet Yami-ichi is formed.

IDPW downloads the Internet-ish sense into the physical space. The Internet Yami-ichi seems to be just nostalgia for the early Internet; however, it is not such an easy thing. IDPW neither installs Internet-ish sense into the current Internet nor remakes the early web on the Internet; instead, it downloads Internet-ish sense into the real place. This procedure cleverly avoids not only going to the nostalgia of the Internet but also being subversive to the uptight situation of current web. The Internet Yami-ichi shows the unique twisted connection between the Internet and the physical space via the Internet-ish sense. The Internet Yami-ichi sells the goods related to the Internet from various points of view. The Internet Yami-ichi does not have the art market as its opponent like *DISOWN*, therefore, the goods more directly reflect the Internet. A media art collective *exonemo*, a member of IDPW, sells "Spacer GIF;" it is a space enclosed in red tape. Of course, it is a joke; "Spacer GIF" is actually a transparent image, often used to control blank space within a web page. The Internet dude, a physical character representing the Internet, does "Real Follow" which imitates Twitter's "Follow" action on the physical space. It means that the Internet dude follows someone in the real space. He does not critically perform Vito Acconci's *Following Piece* again, but it makes Twitter's "Follow" physical and is also just a joke like *exonemo*'s "Spacer GIF." There are a lot of jokes = goods related to the Internet at the Internet Yami-ichi. And, visitors say that it's funny and buy it. Now we must remember that for the secret society since 1914; IDPW itself is a joke!

If you do not understand the jokes of the Internet, the Internet Yami-ichi is just a regretful place. Almost all downloading of the Internet into the real tends to become disappointed physical spaces like *Send me the JPEG*. However, the Internet Yami-ichi

becomes the event that enjoys this regretful situation. The Internet Yami-ichi is always very active flow market. It becomes the location for bringing out many people from the Internet and linking them positively in the physical world.

The word "regretful" explains the success of the Internet Yami-ichi. IDPW describes the Internet Yami-ichi as "regretful electronic commerce;" it means that you have to go the physical spot in order to buy something even though it is an electronic commerce. The word "regretful" implies not negative but positive meaning because IDPW and participants enjoy bothering going to the real space. In short, IDPW uses the word "regretful" in order to show a twisted value between the real and the Internet. This twisted value is similar to a feeling of "regretful" with which SAYAWAKA, a writer of the Japanese subculture, tries to describe a Japanese youth culture of 2010s.

SAYAWAKA considers that the word "regretful" appears with positive meaning on the Internet in Japan during 2006-2009 parallel to prosperous childish subculture like *Niconico*. Furthermore, this Japanese Internet situation indicates that the young, whom the older people regard as regretful, tend to enjoy their "regretfulness." The young Japanese on the Internet do not turn against the older people but reframe the meaning of regretfulness from negative to positive [14]. The Internet Yami-ichi syncs the feelings of enjoyment of the regretful situation by the young Japanese on the Internet.

IDPW says: "Turn off, log-out and drop in on the real world for a change," downloading and installing the Internet-ish into sense in the real place in order to hack and reframe both the real and the Internet. Kensuke Sembo and Yae Akaimwa, members of IDPW and *exonemo*, talked about how we can rediscover a function of the real place via the Internet:

Akaiwa – The real place gathers many people's attentions and make connections.

Sembo – There is unique collective awareness.

Akaiwa – Although the past Internet has places like BBSs in order to get together, it is difficult to feel that there are such places due to Timelines of Twitter or Facebook. So, we realize that the real place has a function that many people physically get together. The Internet Yami-ichi makes full use of this physical place function. [15]

IDPW attempts to make a real place, like BBS, on the Internet. At first, BBS imported the real place function and many people went there and made unique corrective awareness on the Internet. However, this place on the Internet is disappearing on WEB 2.0. Therefore, IDPW made a physical place for internet people to gather in order for the unique corrective awareness of the Internet to be reborn. The physical place is hacked and reframed by the Internet-ish sense, which is made from reorganizing the early "liberty" web and joking about the current

uptight web. This twisted procedure produces the unique feel of the Internet Yami-ichi. IDPW implements new “Face to Face” and “Hand to Hand” via the Internet into the physical place and shows the new function of the real place after the Internet. This procedure is not subversive between the real and the Internet-like art markets in America and the EU.

CONCLUSION

Send me the JPEG and *DISOWN* bring the Internet into the physical place: the art world. DIS, especially, makes a diffusion line for art in order to inject the Post Internet value into the real art world. But, the real and the physical have an overwhelming power in the art world; therefore, the art world considers the place and the artwork imbued with the Internet to be inferior in quality. In short, the traditional art world has not adequately treated the Internet yet. However, DIS does not care about the traditional art world because they want make the very new art value of Post Internet, but this is “not for everyone.”

Unlike DIS and Winkleman Gallery, IDPW attempts not to be subversive of the art world but “to let some fresh air into the world of the Internet – which starting to feel a bit uptight – by downloading our Internet activities to exchange in the actual world, as a flea market.”[16] They use the format of flea market as the locus of a reorganization of Internet and tries to download and install the Internet-ish sense into the physical place; the Internet Yami-ichi. The Internet-ish sense does not belong to the dichotomy between the Internet and the physical, but comes from an outside blank space of the overlapping area between the current Internet and the real. As a result, the Internet Yami-ichi becomes the location for bringing out many people from the Internet and linking them positively with the Internet-ish sense in the physical world.

Finally, I sum up three case studies:

Send me the JPEG by Winkleman Gallery shows the confusion of the dichotomy between the Internet and the physical.

DISOWN by DIS overcomes the confusion of the dichotomy between the Internet and the physical and transforms the crossing of the two into the Post Internet value.

The Internet Yami-ichi by IDPW makes a lot of jokes about the confusion of the dichotomy between the Internet and the physical and hacks and reframes an outside blank space of the overlapping between the two. Consequently, IDPW downloads the Internet-ish sense installed in the real place.

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A STUDY OF ATTRACTIVENESS ON SOCIAL NETWORKS, MUSEUMS AND IMAGES

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ABSTRACT

This paper presents an investigation about the attractiveness on social networks in the museum context. The online platform Museum Analytics was used as sources of information from social network Facebook and besides the social network itself and sites of museums selected for the study. The results observed was: Artwork popularized among the general audience, the renowned artist and supplemented with brief biography, it is attractive but sometimes is not strong research trigger. Images with full description exhibitions or local activities promote visits to the physical museum or raise the interest for. Images associated with trivial factors (such as rainy day, holidays, weekend, for example) promote public appreciation. Even with links to the site of the museum they trigger little online library research. Attractive images with intriguing question (like a riddle, an attribute of the work, a little unknown historical fact, for example) directed to the public of the social network, raise the interest in venturing into little-informed or structured responses. Moreover the proposition of an activity, promotes public interaction with the museum and a bigger public involvement in structured and informed responses. Positive images that do not bring texts or any other resources promote audience appreciation. When negative or ugly, they instigate questions.

MUSEUMS IN THE DIGITAL AGE

In digitalization times, Internet and social networks, the museology, as well as other knowledge areas, has the constant challenge of adapting to technological advances and new forms of communication and the appropriation of information. Museums and / or cultural institutions envision promising resources to get closer to their audiences. It is fact that there is a growing interested online audience to museums, particularly the younger generations, ready for innovation and waiting for breaks in visual presentation.

Museums and cultural institutions have invested considerable resources in online solutions, such as institutional websites, digital collections and social media like Facebook, Twitter and Instagram. The digitalization is sometimes understood in a simplistic way as converting analog information into digital format. However, digitalization is more than a technical and systemic process that involves a sequential and particular set of actions that can result in organizational and functional changes. When the decision to digitalize a collection, the institution must pay attention to digitization standards, metadata standards, systemic impacts, technological advances predicting the demands of planned obsolescence and essentially must be clear about the objectives of digitalization and impacts of these on the function of the institution.

The informatization process of museum's collections and/or cultural institutions implies in archival activity changes and especially in the museological context as a whole. The construction

of digital collections becomes an increasingly growing, accessible, financially viable and, along with this scenario, frequent debates about policies and standards emerge until then consolidated about copyright and information management. These discussions include new elements from the new digital practices such as interoperability, open data, semantic web, data visualization and social networks, for example.

The technology impact on institutions responsible for the preservation of artworks can be illustrated by the Rijksmuseum based in Amsterdam (The Netherlands), which renewed its website in 2013 and released their online digital collection in high resolution. To manage the information flow from more than one million digital objects was hired a data manager, common position in technology companies and never before considered as an integral part of the professional museum / cultural institutions. The museum not only innovated the online availability of its collection in high resolution but especially with Rijksstudio resource that represents an incentive to creation and creativity. The user can download images of artwork, print them or apply them to objects. It can be concluded that with the digitization of its collection Rijksmuseum had at least three adaptations:

- (a) systemic
- (b) organization, with new positions and departments created to meet the demands of digital technology
- (c) functional, that is, a repositioning of museum functions toward the democratization of information, access and freedom of expression of their audience.

The Rijksmuseum is also present and active on social networks like Facebook, Twitter and Instagram. In social network Facebook has over 200,000 page likes, over 50,000 followers on Twitter and over 2000 Instagram followers (Data obtained directly from social networks in October 2014). The digitization of artworks goes beyond the inherent issues in digitalization text documents, both in reproducibility of the visual object as in the representation of digital object produced in a virtual environment like the internet. Visual objects, with their aesthetic potential, must be thought from reproduction and visualization processes that consider these elements, as through aesthetically designed interfaces that involving the users.

The discussion about the reproducibility of the artwork is old, already known about photography and cinema, mostly by German author Walter Benjamin: "In its essence the artwork has always been reproducible. [...] even in the most perfect reproduction, one element is missing: the here and now of the artwork, its unique existence [...]" [1]

According to Walter Benjamin in *The Artwork in the age of mechanical reproducibility* technical reproduction of a work of art [...] can, for example, in photography, accentuate certain aspects of the original, accessible to objective – adjustable and able to arbitrarily select your angle of view, but not accessible to human eyes [...]. On the other hand, the view of the object produced, the digital object, should take advantage of the possibilities of technology and break with the organization of its themes into discrete categories, as exemplified by Lev Manovich in his essay *NURBS Theory: Books and museums devoted to art, design, media and other cultural areas continue to arrange their subjects into small numbers of discrete categories: periods, artistic schools, -isms, cultural movements. The chapters in a book and rectangular rooms of most museums act as material dividers between these categories. A continuously evolving cultural “organism” is forced into artificial boxes.* [2]

Visualizations that break with traditional views and point to a dynamic and interactive digital scenario, such as William Kentridge *Five Themes* exhibition at MoMA that happened in 2010 and today still can be seen on the museum’s website at MoMA Multimedia section and through interactive tool (Fig. 1) navigate the themes of the artist’s practice presented in the exhibition. [3] The big advantage of a view as this is the curatorial connections, involving the selection and organization of the artist’s works, can be exposed without the temporal logic of the timeline that does not represent the importance and connections proposed by the artist. In the case *UBU AND THE PROCESSION*, becomes a “node” – “point de capiton” – where other relations depart or other relations are.

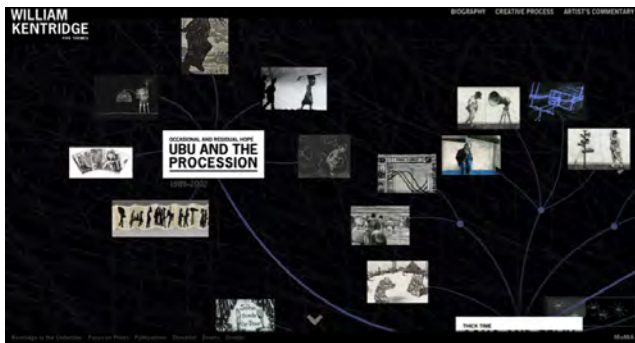


Fig. 1. William Kentridge, *Five Themes*, MoMA Multimedia.

According to Andrea Witcomb in *The Materiality of Virtual Technologies: A New Approach to Thinking about the Impact of Multimedia in Museums* “[...] the use of emerging digital technologies to enable, engage and transform the cultural heritage is accompanied by changes in organizational culture and practice of institutions charged with their care.” [4] Contemporary discussions on the impact of technologies on museums tend to assume a extreme positions between the virtual world and the material “The material world carries weight (aura),

evidence, the passage of time, the signs of power through accumulation, authority, knowledge and privilege [...] Multimedia, on the other hand, is perceived as ‘the other’ of all these – immediate, surface, temporary, modern, popular and democratic.”

Technologies represent a threat to established practices or an opportunity to reinvent themselves and ensure their own survival in the twenty-first century. The loss of institutional authority, the loss of ability to distinguish between the real and the copy, the death of the object and a reduction of knowledge to information represent major concerns and resistance to new technologies at the expense of possibilities as the emergence of new associations democracy around the museums. Despite discussions and varied positions, digitization of art collections and collections available on the Internet come up with the most varied purposes, the source of inspiration to enjoyment, bring make art accessible, democratic, as the main motivation for considerable investment of time and resources.

SOCIAL NETWORKS

After a huge investment to digitalize a collection, the museum usually joins a social network to increase website visits. This is a justifiable reason to join in a social network, nevertheless not the only one; this initiative can help the institution to fulfill its organizational mission. According to the ICOM Statutes, adopted during the 21st General Conference in Vienna, Austria, in 2007: A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment. [5] The information democratization, knowledge dissemination, access and public approximation are reasons for the use of social media by museums.

However, the accession of museums to social networks is also not an easy activity for the institution, especially when decide by social networks such as Facebook, Twitter and Instagram. Do not just create a Facebook page, a Twitter account and / or Instagram: the published content should be planned, structured and committed to the mission, goals and curatorial initiatives of the institution, as well as aligned with the best practices suggested by social platforms for better use of their resources. For example, Facebook has published some best practices, three of which are listed below:

- Keep text short
- Be timely
- Use engaging images and videos

Keep text short: Be succinct and conversational and keep your posts short whenever possible. We recommend posts between 100-250 characters to attract more engagement.

Be timely: Your audience will be most likely to engage with your posts if you create content that is top of mind, such as current

events, holidays or recent news. Use engaging images and videos: Rich media like photos and videos get more attention and help your message stand out in news feed. Use quality and relevant images.

The best practices of Twitter are not radically different from those referred by Facebook. The main difference is that Twitter is less visual than Facebook. The activity of updating a social network with interesting content, aligned with the institution's strategies, appropriate to the new forms of communication and information ownership is not a simple activity, is time consuming, must be planned and it is fundamental that their effectiveness be analyzed.. Given due consideration to the best publications practices, aligned to the institution goals and curatorial strategies, the question arises: How to measure the effectiveness of social networks?

Facebook suggests reviewing the performance of your posts and their recommendation is to monitor the Page Insights to better understand the profile of your audience and see which content is working best to reach and engage them. [6] Through this feature, you can monitor the success of the Facebook page, another feature to measure, specifically the attractiveness is the Museum Analytics Platform. [7] Museum Analytics is an online platform for sharing information about museums and their audiences. For each museum, a report is provided with information about the online and offline public daily. The reports are used by the communication areas of museums for monitoring and evaluating the status and progress of the attractiveness of the institution to its audience. A user can subscribe to receive a report on the page of a specific museum, city or country. The weekly report brings the 10 most engaging content items for the period, from both Facebook and Twitter.

THE STUDY

This paper presents an investigation into the possible causes and effects of social network phenomenon in the museum context as regards the attractiveness of the public. The online platform Museum Analytics was used as a source of information from social network Facebook and besides the social network itself, sites of museums selected for the study. Samples that were considered minimally met the best practices suggested by the social network Facebook, such as photos and video content, succinct texts and weekly updates, which were organized according to previously designed combinations defined by the present study.

Figure 2 illustrates a publication of Saatchi Gallery, which makes use of an image and a short text. Saatchi Gallery updates daily their Facebook page with brief publications and attractive images as shown above; nowadays it is an institution of strong engagement with the public through social networks. Criteria for evaluating were also suggested: the attractiveness (mainly represented by "likes") and the strengths and weaknesses of the comments and possible research triggers and content deepening. The "like"

option is a feature of social networking service Facebook, where users can appreciate content published, such as photos, videos, comments, links and status updates. The comments box is a feature that lets people comment on content published.



Fig. 2. Saatchi Gallery Post, Facebook.

Figure 3 is an example of a Facebook publication:



Fig. 3. Art People Gallery Post, Facebook, Art People Gallery, *Intricate Egg Carvings* by Franc Grom.

This publication received 1635 likes and comments such as: "So beautiful," "Wow," "Very nice," "*Lindo*" (*lindo* is beautiful in Brazilian Portuguese). Comments such as these mentioned above strengthen the appreciation already demonstrated with the use of the Like button. However, it is sometimes used as the opposite of appreciation, for example: "*that's just ridiculous.*"

Considered in this study:

Comments that reinforce the appreciation or non- appreciation of publication as weak comments.

Comments (at least one) that add content / information for publication as strong comments, i.e., possible research triggers and content deepening.

Figure 4 is an example of strong comment.



Fig. 4. Museo Nacional del Prado Post, Facebook, Museo Nacional del Prado ¡Feliz Navidad!, “Adoración de los Pastores,” El Greco (1612-1614).

Comment: “Un cuadro maravilloso, del Greco, Domenico Teotokopulus, nacido en Creta, venido a España a la corte de Felipe II, en la que no fue muy bien acogido como lo demuestra que su cuadro del Martirio de San Mauricio no fuera el que se expone principalmente. A mí es un autor que me gusta mucho, y que además este cuadro sale también en un libro pequeño de su autobiografía de editorial 100, que adquirí en el instituto, en la parte de atrás del libro. Dónde cuenta toda su vida, y las disquisiciones que había con su pintura, porque a muchos

críticos de la época no les gustaba, debido a su incipiente manierismo dónde las formas se van hacia el aire que se puede ver aquí en los cuadros de la Asunción, Anunciación, Natividad. Y esos colores destacados del amarillo, el azul lapislázuli que parece salido de cómics. Y sobre todo se habla en el libro de las guerras que había entre las escuelas de Roma y Venecia ya que el Greco se formó en la de Milán y se ve influencias de las dos escuelas, como aquí las influencias de Tintoretto en lo oscuro, que precede el próximo estilo barroco, lo nacarado de los cuerpos, escuela de Venecia y la de Botticelli en la de Roma.”

The translation:

“A wonderful picture, del Greco, Domenico Teotokopulus, born in Crete, came to Spain to the court of Philip II, which was not well received as evidenced by his picture of the Martyrdom of St. Maurice was not that exposed mainly. To me it is an author I really like and also that this table also comes in a small book publishing his autobiography 100, I acquired in high school, in the back of the book. Where has all his life and the disquisitions he had with his painting, because many critics of the time did not like, because of their budding manierismo where forms go into the air which can be seen here in the pictures of the Assumption, Annunciation, Nativity. And those featured colors of yellow, blue lapis straight out of comics. And mainly spoken in the book of the wars that existed between the schools of Rome and Venice as the Greco formed in Milan and influences of the two schools, as here the influence of Tintoretto in the dark is that next preceding Baroque pearl of the bodies and the Venetian school of Botticelli in Rome.”

THE OBSERVATION

The observation period and data collection was from August 2013 to December 2013. During this period, the weekly report about the most engaging Facebook content provided by Museum Analytics platform was the basis for the research. The number of likes received by a post is the variable used by the platform to generate the weekly report.

Figure 5 is a report example.

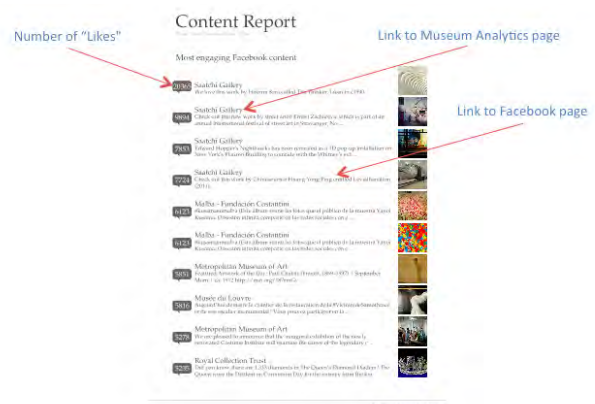


Fig. 5. Museum Analytics Report (Weekly).

Below are some characteristics of the weekly report of the platform Museum-Analytics:

- Posts are displayed in descending order.
- The gray balloon contains the number of likes received by posts in the period.
- The museum name contains a link to the museum page at platform Museum-Analytics.
- The description of the post contains a link to the Facebook museum page.

In this study, 22 reports, 220 posts and numerous comments were analyzed. A sample of 220 messages is not large enough to generate statistically significant results, but it was possible to map similarity between the posts, which are exemplified below:

On August 17, 2013 MoMA posted on their official Facebook page a post that contained an amazing image that brings a dramatic and mysterious scene. Additionally, the public was invited to know details of the artwork on the museum site (Fig. 6).



Fig. 6. MoMa Post, Facebook, MoMA The Museum of Modern Art, Andrew Wyeth. "Christina's World" (detail). 1948, View the full work here: <http://bit.ly/14ldKyc>.

It was the eighth most liked post of the week of August 12 to August 18, 2013. There were more than 100 comments, among them many comments suggesting deepening of structured content and research by the public, for example:

"The woman crawling through the tawny grass was the artist's neighbor in Maine, who, crippled by polio, 'was limited physically but by no means spiritually.' Wyeth further explained, 'The challenge to me was to do justice to her extraordinary conquest of a life which most people would consider hopeless.' He recorded the arid landscape, rural house and shacks with great detail, painting minute blades of grass, individual strands of hair and nuances of light and shadow. In this style of painting, known as magic realism, everyday scenes are imbued with poetic mystery."

In this study the post was categorized as:

Artwork / Artist renowned or popularized among the general audience	Link to the museum website	Attractive post and comments strengtheners
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In the same week, Post number 1, the most liked, belonged to Saatchi Gallery. The post had an image, a succinct text, but did not have a popular author or link (Fig. 7). Over 300 comments were analyzed. The most comments of admiration were "Good art," "Really nice," "Love it."



Fig. 7. Saatchi Gallery Post, Facebook. Saatchi Gallery
Check out this work by Japanese artist Aida Makoto called *AZEMICHI* or a path between rice fields.

The comments in the example above were considered weak comments that do not represent the exchange of information and increasing knowledge.

Positive / beautiful / nice image - Succinct text - Attractive post, but weak comments.

During the week of September 16 to September 22 (2013), the MET published a work of Gustave Courbet associated with the autumnal equinox and the public were invited to enjoy the last days of summer and visit the Pinterest page (Fig. 8).



Fig. 8. MET Facebook Post, *The Metropolitan Museum of Art, New York* Sunday is the autumnal equinox. Enjoy the final days of summer with depictions of the season on our Summer Pinterest board. <http://met.org/1eVkZ10>
Gustave Courbet (French, 1819–1877) | *The Calm Sea* | 1869.

The comments in the example above were considered weak comments that do not represent the exchange of information and increasing knowledge.

Trivial Factors / Routine - Description

Link to Pinterest.- Attractive post but comments weak.

In the same week, the most attractive post was a Saatchi Gallery publishing (Fig. 9).



Fig. 9. Saatchi Gallery Post, Facebook *Saatchi Gallery* / We love the graffiti birds of Brazilian artist Luis Seven Martins, aka L7m. Look out for them on the streets of Sao Paulo.

The comments in the example above were considered weak comments that do not represent the exchange of information and increasing knowledge.

Attractive / interesting image - Proposition - Attractive post and comments strengtheners

A user, for example, added the link to the page of the artist in the comments.



Fig. 10. Facebook Comment.

Another publication about a renowned artist, but without details or links is presented below (Fig. 11):



Fig. 11. Saatchi Gallery Post, Facebook, *Saatchi Gallery*, We love this work by Picasso called *La Soupe* (1903).

The analysis of the comments shows that even being a known work of a renowned artist in a remarkable period in his career, there were no strong comments, only appreciation comments. Therefore, in this study, this post was categorized as attractive, but not so stimulating for deeper understanding.

Artwork / Artist renowned or popularized among the general audience - Succinct text - Comment weak

Upon the death of Nelson Mandela, Saatchi Gallery published a tribute to the great leader (Fig. 12). A photo by Adrian Steirn and the phrase: "No one is born hating another person because of the colour of his skin or his background or his religion. People learn to hate and if they can learn to hate, they can be taught to love, for love comes more naturally to the human heart than its opposite" triggered a strong effect on users of the social network, making the post one of the most attractive 10 posts during the week of 02 to 08 December 2013.



Fig. 12. Saatchi Gallery Post, Facebook.

Sad - Succinct text – Comments Strengtheners

Below a comment:



"Education is the most powerful weapon which you can use to change the world."
Fig. 13. Facebook Comment.

On September 30, 2013, Museo del Prado published a picture of the artwork *Prometheus Bound* by Peter Paul Rubens with the following caption:

Museo Nacional del Prado Post, Facebook, Museo Nacional del Prado. Desde hoy se puede ver en la sala 28 del Museo la obra "Prometeo encadenado" de Rubens y Snyders, propiedad del Philadelphia Museum of Art. La obra formará parte de la exposición "Las Furias" que se inaugurará en enero de 2014. Más información en: <http://bit.ly/1fVHrVN>

This publication aroused the public's interest in obtaining more information about the exhibition.

Exhibitions / Local Activities - Succinct text – Comments Strengtheners

The comments indicate that the public researched details of the exhibition on the museum's website. Through the analysis of 220 posts, it was possible to map the constancy of certain features and consequent actions of the social network user. Figure 15 is a spreadsheet example of how the mapping was done.

CONCLUSION

Through the study, it was possible to map similarities and constancies between posts, even using a small sample.

RESULTS:

- Artwork that is popularized among the general audience, by a renowned artist and supplemented with a brief biography is attractive and sometimes is not a strong research trigger.
- Images with full descriptions at exhibitions or at local activities promote visits to the physical museum or raise public interest.
- Images associated with trivial factors (such as a rainy day, holidays, the weekend) promote public appreciation. Even with links to the site of the museum, they trigger little online library research.

Appendix
05 Aug - 11 Aug / 2013

Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		Dramatic painting	Strong comments	(6)
Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		Nice picture	Weak comments	(5)
Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		Celebrating the birthday of a renowned artist	Strong comments	(1)
Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		Commenting routine / trivial factors	Weak comments	(5)
Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		Commenting routine / trivial factors	Weak comments	(5)

Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		About popular work	Weak comments	(1)
Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		Commenting routine / trivial factors Link to museum website	Weak comments	(5)
Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		Attractive / Interesting image Invites the audience to share your photos	Strong comments	(4)
Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		Celebrating the birth of a special person / social event	Weak comments	(5)
Search Gallery: A portrait of a man with a raised fist, surrounded by handwritten text.		Invited to an exhibition	Strong comments	(2)

Fig. 15. Mapping.

- Attractive images with intriguing questions (like a riddle, an attribute of the work, a little unknown historical fact) directed to the public of the social network, raise interest in venturing into little-informed or structured responses. Moreover, the proposition of an activity promotes public interaction with the museum and a bigger public involvement in structured and-informed responses.
- Positive images which do not bring texts or any other resources promote audience appreciation.
- When negative or ugly, they instigate questions.

Table 1 presents an overview of the results:

Image Video	Succinct texts Links	Categorized
Artwork / Artist renowned or popularized among the general audience	Succinct text	Comment weak / Strengtheners
Exhibitions / Local Activities	Succinct text	Comments Strengtheners
Trivial Factors / Routine	Succinct text	Comments weak
Attractive / Interesting	Intriguing question / Activity proposition	Comments Strengtheners
Positive / beautiful / nice / happy	Succinct text	Comments Weak
Negative / ugly / dramatic / sad	Succinct text	Comments Strengtheners

Table 1. Results .

The next step of the study is to validate the results from the institutions.

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BASIC DESIGN FOR THE INTERACTIVE ARTWORK *IMAGE GARDEN* BASED ON THE TRADITIONAL KOREAN MYTH *LADY WONANG*

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ABSTRACT

The aim of this study is to propose a new framework for interactive artwork through the Korean archetype. Based on the framework, we proposed a basic design for an interactive artwork called *Image Garden* by applying the Korean myth *Lady WonAng*. In the myth, *Lady WonAng* bloomed in a wasteland and saved the world, triumphing over adversity through her devotion. Based on case studies – narrative form, activity theory and pleasure framework – the research extracted three factors for producing method from myth text for an interactive artwork. This framework creates an opportunity to produce an interactive artwork to attribute basic design, artwork structure, embodiment of contents and creativity. Using this framework, we propose a basic design for the image garden using a narrative approach. The audience member makes the images of flowers bloom through his or her own actions as *Lady WonAng* or as a character in a wasteland overcoming trials in an environmental crisis.

INTRODUCTION

Background

Interactive artwork is developed by new digital technologies. New technology includes wearable computing, multi-modal devices, N screen and cloud computing. When applying these technologies, how could interactive artwork change the artwork content? A basic idea is that new digital technologies stir the audience by installation. And then the installation is stirred by the audience's reaction. The audience's experience is created in this way. In interactive digital art, the artist is concerned with how the artwork behaves, how the audience interacts with it (and possibly with one another through it) and, ultimately, in participant experience and their degree of engagement. [1] Audiences participate in interactive artwork installations in various ways. This research focused on audience activity because action reflects the audience's desire. Another instance of audience participation could be a coincident and momentary reaction. Action only generates audience action.

The basic structure of the interactive artwork comprises three factors. [2]

- Input – audience participation
- Medium – installation or device
- Output – contents

Input

The input in interactive artwork is generated by audience participation. The basic audience participation is physical gestures and audience movement. But the development of computer technologies, cognition, psychological stimulus or very small change in the body become the input data to operate the installation.

Medium

The audience participation acts on the medium – the artwork installation, screen, object or wearable device. And then medium interacts with the audience.

Output

Output by interactive artwork installation is varied. It is important to create an embodiment for aesthetics. The audience's experience brings on changes in emotion.

The participation of the audience creates input data and is mediated by installation and embodies on the output, becoming the artwork content. The overall process is aesthetic experience through the interactive artwork. Thus far, research for an interactive artwork has focused on making an installation using computer science. So much of it seems to overlook audience participation and embodiment of artwork content. The research direction must change in fundamental ways using two extended factors. One is the extension input data affecting the audience. Another is the output data mediated to affect the audience. Two extended factors are mediated by installation. Although the digital technologies for interactive artwork have been developed, the basic process of interactive artwork installation is as follows. [3]

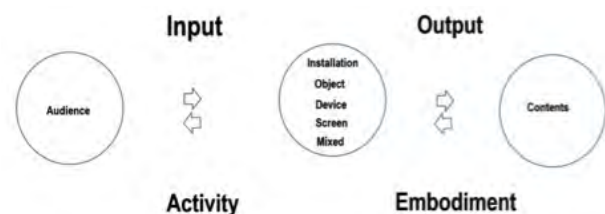


Fig. 1. Basic structure of interactive artwork installation.

The most important thing is how to improve audience activity for input data or to raise the quality for embodiment for output data. The enhancement for digital facilitates a reaction to an installation by the audience. For it realized that the interactive artwork should arouse a desire in the audience to operate an interactive artwork installation. How does it affect extended input and output to installation? How does it affect creative embodiment? It is time to focus on an archetype to stir the desire of the audience.

MOTIVATION

An archetype is a statement, pattern of behavior or prototype that other statements, patterns of behavior and objects copy or emulate. Archetype is a universal story to give pleasure and create sympathy among people in imaginary ways. Archetype give creative inspiration basic structure and embodiment for artwork. Character and narrative are the basic factors in archetype. Producing artwork

based on archetype is related to extending creative contents and finding a universal structure for artwork content. An archetype is applied because finite humans have questions about origin and roots and want to find their identity. Traditional artworks have their own structure and imagery. Characters in the artworks fight traditional values and combat old, conservative groups. The character may win or lose in a traditional society, but ordinary people want to know the process of resistance, not knowing the outcome. The character gains readers' sympathy.

For this reason, research focused on the myth as a sort of archetype. A myth is, broadly, any worldview-based traditional story or collection or studies thereof. The myth has a narrative for telling a story. The myth is a common symbol inbuilt in the unconscious of human beings. Narrative in the myth has patterns of human action and thinking. Therefore it is meaningful to make a creative artwork based on archetype. There are many methods to apply—subject, superhuman character, embodiment of pattern of traditional structure, symbol of images, universal feelings and narrative patterns.

Study Aims

The aim of this study is to propose a new framework for interactive artwork through the Korean archetype. Based on the framework, we proposed a basic design for an interactive artwork, an image garden, by applying the Korean myth of *Lady WonAng*.

Study Process

The following is the process of the paper:

- Case studies focus on interactive artwork creation.
- Three factors are extracted from the text of the Korean archetype.
- A new method to produce an interactive artwork applying these factors is proposed.
- A basic design for an interactive artwork based on *Lady WonAng* uses a new method.

Through this process, we proposed a new method for interactive artwork and a first version of interactive artwork in a narrative view.

LITERATURE REVIEW

Structure of interactive artwork

Fel classified four categories for interactive artwork in standard audience action. Fel proposed four categories for interactive artwork based on audience participation for embodiment. [4]

The audience affects interactive installation and reacts to the artwork installation.

The dimensions of the classification are as follows:

- Content provider: produces the raw material processed by the IDA
- Processing dynamics: variability of the process
- Processing contributors: the sources affecting the dynamics of processing [5]

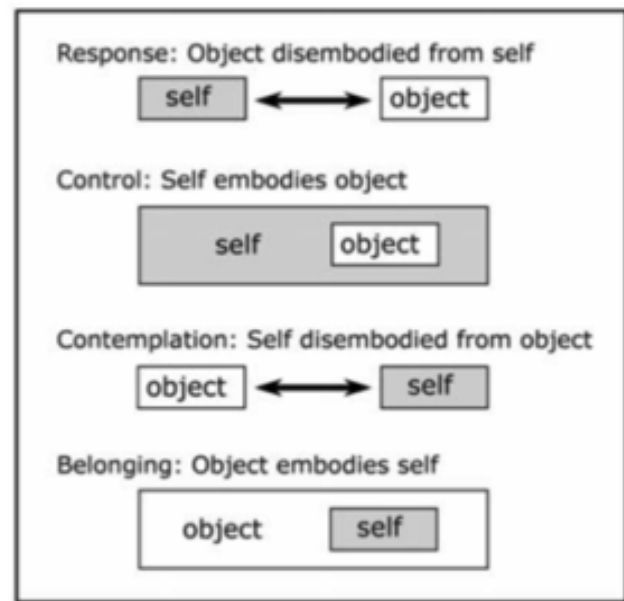


Fig. 2. Fel's categorization of embodiment. [4]

Four categories arise: the "relationship between the artwork, artist, viewer and environment:"

- Static: there is no interaction
- Dynamic-Passive: the artwork response is triggered by environmental factors
- Dynamic-Interactive: the human presence and/or actions (purposeful or not) are used as parameters for changing the artwork, whose processing rules are static
- Dynamic-Interactive (varying): the processing rules used by artwork to change its output are modified by an agent (the artwork software or a human) [6]

Clifton's paper developed the following list of techniques for scripting the interaction based on gestures recognized as a design for an interactive artwork. [7]

- Verbal – A character verbally directs the interactor to perform an action.
- Audio-visual – The setting and soundscape indicate that some action can be taken.
- Reactive – A sudden change in the drama causes the interactor to perform an action without thinking about it.
- Mimetic – The interactor performs an action after first seeing it performed by a character.

Using these research, our research proposed a new process of interactive artwork structure. The process of audience participation in interactive artwork includes an embodiment as follows:

The audience's participation in the artwork content was mediated by digital installation. The audience's direct intervention is quite different from traditional appreciation of artwork. First, audience inputs data through its own participation – this is

the essence of an interactive artwork. The input data come from audience's physical movement, actions, behaviors or physical stimulation.

Second, digital installation mediated by computer technologies is a connecting factor between audience participation and artwork content.

Third, artwork content is embodied by various methods for artists and the audience. The method for embodiment is impossible to adjust in terms of visualization, sonification, haptic devices, smell, taste or synesthesia.

Our research focused on verbalization in performing an action in the interactive artwork and how factors affect the outcome.

Structure of interactive artwork

Otitoju et al proposed SenSpace that is a multimedia installation that uses visual, audio and tactile cues to convey the Greek myth of Narcissus to the user. [8]

The audience, as Narcissus, sees the ponds and reflected self-image. It experiences changing into a flower through the myth.



Fig. 3. Process of audience participation in interactive artwork, including embodiment

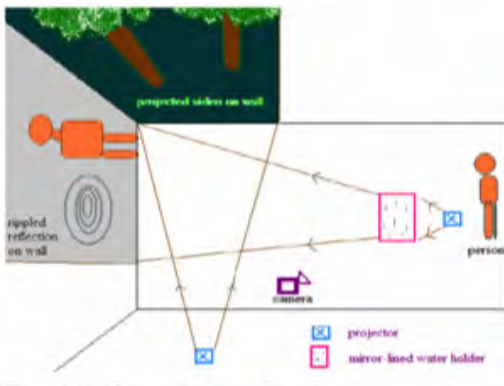


Fig. 4. SenSpace setup

Audience action in an interactive artwork based on archetype was just a movement in the ancient myth. The artwork represented a scene in the myth. Only the environment of the artwork was

included; visual images or audio files were borrowed. Reflecting a myth comes from a basic structure or the spirit of the age in the myth. A creative application for the origin of the myth is needed.

Mok's research proposed an interactive artwork showing the changes that may occur in the physical distances between the audience members and displayed the formation of relationships. [9] The artwork is based on the "Dinghundian," a Chinese archetype. But the research only came from the object to embody images and did not consider patterns of basic narrative and actions of the character.



Fig. 5. Interactive artwork: *Heart, Line and Circle*.

Ryu proposed an interactive artwork based on Korean archetype. [10] VoicingElder aims to fuse Korean shamanistic ritual and twenty-first century virtual interactive technology to examine the current state of elderhood in Western culture and to contribute in positive ways to the new elderhood that we face today.

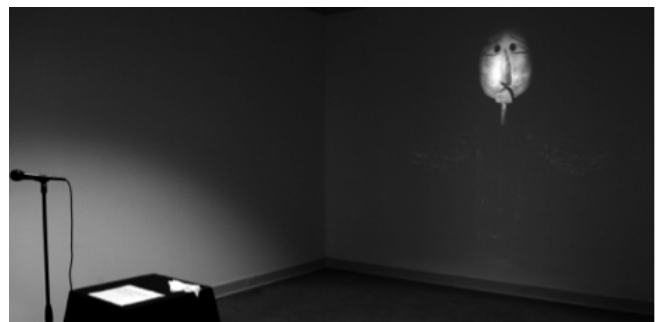


Fig. 6. *VoicingElder*, an expressive storytelling platform for the senior population, using virtual puppets.

The research contributed to the understanding of shamanism and Korean traditional feelings. The action of the audience in the artwork reflected the essence of the Korean archetype. The research will propose an essence of spirit of the Korean archetype. A total framework for an interactive artwork based on archetype is needed. This paper will create a concept of the Korean archetype in an interactive artwork.

CASE STUDIES

To make the new framework from myth text to interactive artwork, this study studied three cases – narrative form, activity theory and pleasure framework.

Narrative Form

Narrative form for interactive artwork is a new framework for the artist and researcher to converge in terms of new technology and narrative. [11] The framework involves interactive storytelling. The audience enjoyed an interactive artwork installation relevant to narrative by action. They felt the emotion based on narrative content. To enjoy narrative in an interactive artwork, the artist or researcher considers five factors.

Factor	Interactive art in narrative forms
Main-objective	The audience wants to be or to do something
Main action	Interactive actions of the audience
Obstacle / conflict / competition	Obstacles and conflict overcome by the audience actions - First / second / third obstacle
Development	Development of narrative through conflict by the audience - First / second / third development – try to overcome the crisis
Climax and ending	The climax is the peak period of conflict in the narrative as developed by the audience action The ending resulting from audience's choices

Table 1. Interactive artwork in narrative forms. [11]

ACTIVITY THEORY

Activity theory is a conceptual framework originally developed by Aleksei Leontiev and has its roots in the socio-cultural tradition in Russian psychology. A physical movement of the audience is categorized by three levels. The audience moves bodily in three categories and representations in an interactive installation. A meaningful movement affects interactive installation and creates an artwork's contents. Activity theory deals with the physical movement of humans in terms of three factors: subject, medium and object. In this way, audience action in an interactive artwork is mediated by installation-caused outcomes or artwork content. The structure is simple while expanded by social context. The origin triangle of activity theory is as follows. [12], [13]

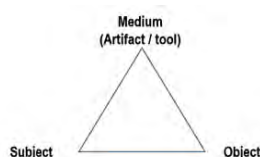


Fig. 7. The origin triangle of activity theory. [12]

The subject did act through the medium and achieved an object. The activity theory expanded by social context to adjust universal organization and private action. Through expanded activity theory, audience action is mediated by three factors: rule, community and role.



Fig. 8. Expanded mediational triangle model. [12]

Our research applied this expanded triangle to the activity of the interactive artwork model. The following model is the interactive artwork model applied by activity theory.

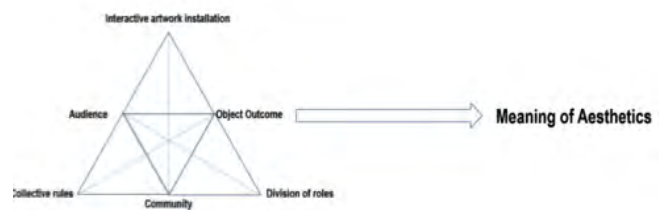


Fig. 9. Interactive artwork model applied by activity theory.

The audience outcome is its own action via installation. The outcome in an interactive artwork is the meaning of the aesthetics. The meaning of aesthetics includes pleasure, experience and stimulation of desire. Therefore, audience action is considered based on six factors in activity theory when making an interactive artwork.

- Audience: The audience in an interactive artwork is a subject to generate artwork based on action. The action by the audience is mediated by interactive installation and creates the artwork content.
- Interactive artwork installation: Interactive artwork installation is a bridge of input and output by digital technologies. Interactive artwork installation is a medium and embodiment device.
- Outcome: The outcome in interactive artwork is that of the audience and installation. The outcome comes from the artist and the audience.
- Rule: In the extended theory, the action of the audience is under the control of society.
- Community: In extended theory, the action of the audience is included in communities.
- Role: In extended theory, the action of the audience took the role of communities.

To create an interactive artwork based on activity theory, six factors of expanded activity theory are considered.

Pleasure Framework

The audience feels emotion through the artwork. In an interactive artwork, audiences feel emotion through their own action and participation. Other artworks bring emotion to the audience through appreciation and interpretation. This is a critical difference. The audience can directly change its mind and action through participation in an interactive artwork. Research focuses on emotions of human beings: psychology, sociology, anthropology or cultural studies. Emotion is categorized by either four or eight feelings. In an interactive artwork, the audience has an experience and feels emotions in reaction to the installation. The audience feels emotions in two ways: by action or by contents.

The following table adjusts the classifying patterns of flowers in the "Pleasure Framework" by Brigid Costello. [14]

Groos	Callois	Csikszent	Apter	Garneau	LeBlanc	Framework
				Power Creation	Expression	Creation
Pleasure of being a cause			Exploration	Discovery	Discovery	Exploration
		Problem Solving		Intellectual problem solving		Discovery
			Challenge	Application of Skill	Challenge	Difficulty
	Competition	Competition		Competition Advancement & Completion		Competition
	Chance	Risk & Chance	Facing Danger	Thrill of Danger		Danger
				Immersion Beauty	Submission Sensation	Captivation
	Vertigo		Arousing Stimulation	Physical Activity		Sensation
Aesthetic sympathy						Sympathy
Pleasure of make believe	Simulation	Creative	Fiction & Narrative		Narrative Fantasy	Simulation
		Friendship & Relaxation		Love Social Interaction	Fellowship	Camaraderie
			Negativism Cognitive Synergy	Comedy		Subversion

Fig. 10. Pleasure Framework. [14]

The Pleasure Framework has thirteen pleasure emotion categories in an interactive artwork. These are creation, exploration, discovery, difficulty, competition, danger, captivation, sensation, sympathy, simulation, fantasy, camaraderie and subversion. Audiences feel thirteen pleasure emotions to participate in an interactive artwork. This is the aesthetic for participation and experience based on action and reaction to interactive installation. In the end, the audiences change their emotions after participation in an interactive artwork. And then their actions will change in terms of changing emotion.

METHOD

Subject

The archetypes of the Je-Ju are myths or folktales that have come down to us by popular tradition in the Je-Ju Island area. The Je-Ju myth is based on shamanism and ritual ceremony. An original myth came down via song and orally transmitted literature. Now oral ritual ceremony transfers a text literature for conservation. The

process of transferring text keeps the dialect or standardizes words. But the main character and narrative maintain the structure. Therefore, extraction in text is basic analysis through the in-view of linguistics.

As a basic motivation, this research analyzes the Je-Ju Island myth for extraction factors for method. *Lady WonAng* is a kind of SeoSaMuGa or a narrative shamanism song of Je-Ju Island in Korea. The SeoSaMuGa in Je-Ju includes 200 pieces. The Korea Creative Content Agency (KOCCA) has proceeded on a project named "Digital Je-Ju Project" on myths and folktales in Korea. Archetypes in Je-Ju are different from those of the inland area of Korea because Je-Ju is far away. The project gathered various Je-Ju archetypes about 300 works and built a digital database service for applications to procure digital content.

Extraction Method

Extraction of Narrative Form

The narrative form in an interactive artwork is related to extraction of the main scene in an interactive artwork installation. The meaningful scene fulfills various factors: setting, aims, embodiment, etc. The form sets the main audience as a character and composes an environment for adjustment.



Fig. 11. Composition of interactive artwork scene.

Extraction of Activity Theory

The method from archetype text to interactive artwork in view of activity theory extracts the action verb in the myth text and analyzes its meaning. In the text, a verb shows the action of the character. The narrative comprises various verbs to act on the desire of a character. Many actions in the text are related to main characters and sub-characters. The research focused on actions of main characters. Through the extraction of the action verb in the text, we applied activity theory to create a main action in the interactive artwork.

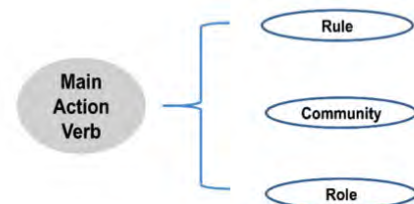


Fig. 12. Extraction of main action verb.

Extraction of Pleasure Framework

The method from archetype text to interactive artwork in view of the pleasure framework is to extract the emotion verb in the myth text and analyze the meaning.

The emotion verb expresses the character's state and the audience (reader) feels the emotion of the character's state. Empathy for a character is a major issue in the artwork. Through the process, audiences enjoy the interactive artwork.

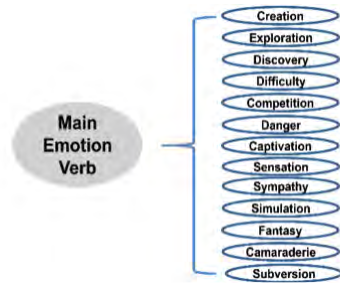


Fig. 13. Extraction of main emotion verb.

Overall Extraction Method

Narrative scene extraction

The table is an extraction scene from the archetype text. In the extraction scene, main conflict comes from the character's conflict with other.

Factors	Extraction scene	Main conflict
Scene Number	Contents of scene	Character conflict with others—antagonist, groups, society, or destiny

Table. 2. Narrative scene extraction.

Narrative framework by verb extraction

The table is a narrative framework by verb extraction. We analysis on main action verbs and emotion verbs by five factors in the narrative framework.

Narrative Framework	Main Action Verb	Main Emotion Verb
Aim	Main action verb of aim	Main emotion verb of aim
Main Action	Main action verb of main action	Main emotion verb of main action
Conflict	Main action verb of conflict	Main emotion verb of conflict
Development	Main action verb of development	Main emotion verb of development
Climax and Ending	Main action verb of climax and ending	Main emotion verb of climax and ending

Table 3. Narrative framework by verb extraction.

Overall extraction method

The following image is a basic process by overall extraction method through narrative forms, activity theory and pleasure framework. The interactive artwork scene is composed of three stages.

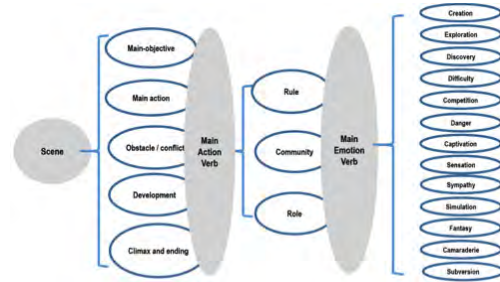


Fig. 14. Basic process by overall extraction method through narrative Forms, activity theory and pleasure framework.

Framework for Basic Design

The following image is overall framework for basic design of interactive artwork applied extraction method. The archetype contents convert into an interactive artwork through the advanced stages.

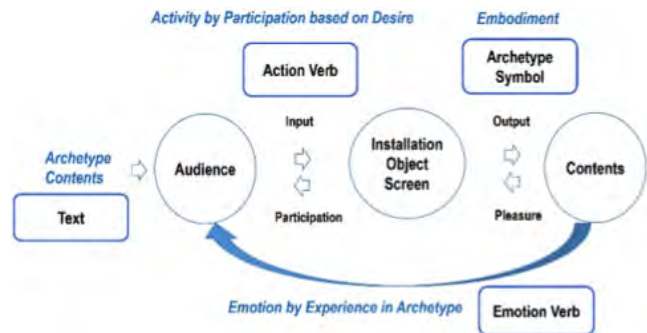


Fig. 15. Overall framework applied extraction method.

NARRATIVE SCENE AND FRAMEWORK

Narrative Scene Extraction

The table is a scene from the narrative form to create a real interactive artwork. The research categorized twelve scenes for the character's aim and main action. And then we analyzed the main conflict in the each scene to create a narrative form.

Factors	Extraction Scene	Main Conflict
Scene 1	Crisis for wasteland	To bloom or not to bloom
Scene 2	Adventure of King and Lady WonAng	To go to a destination or not to go
Scene 3	Mr. JaHyun stays, SeoCheon leaves	To leave or to stay
Scene 4	Conflict between Lady WonAng and Mr. JaHyun	To create trouble or to overcome

Scene 5	Birth of AnRakGuk	To give birth or not to give birth
Scene 6	Adversity of mother and son	To create trouble or to overcome
Scene 7	Escape and adventure of AnRakGuk	To escape or to stay
Scene 8	Murder of Lady WonAng	To die or to live
Scene 9	Boy meets father	To meet his parents
Scene 10	Rebirth of Lady WonAng via Flower Ceremony	To rise from the dead
Scene 11	Resurrection of the garden	To create blooms in a withered garden
Scene 12	Overcome crisis and spread flower	To bloom worldwide

Table 4. Results of narrative scene extraction.

Narrative Framework by Verb Extraction

The following table is the extraction result. The *Lady WonAng* text is analyzed by the next factors.

Factors	Narrative Framework	Main Action Verb	Main Emotion Verb
Aim	Audience wants the withered garden to bloom	To bloom (role)	Surprised, pleased (captivation)
Main action	Audience plants flowers	To plant flowers (role)	Passionate (creation)
Obstacle/ conflict	Planted flower quickly dies	To resist the environment (rule)	Difficult (difficulty)
Developing	Bloom various flowers	To try to bloom in various ways (role)	Improved (discovery)
Climax and ending	Audiences overcome hardship and create a blooming garden	To bloom and spread the skill (rule/community/role)	Satisfied (creation)

Table 5. Narrative framework by verb extraction.

Our research synthesized these results and proposed a basic design for an interactive artwork based on archetype.

BASIC DESIGN

Basic Process

The framework focused on the combination of three factors, which create an interactive artwork. The audience has an experience with the archetype narrative through its own actions and feels emotions during the interactive artwork installation. This framework creates an opportunity to produce an interactive artwork to attribute basic design, artwork structure, embodiment of contents and creativity.

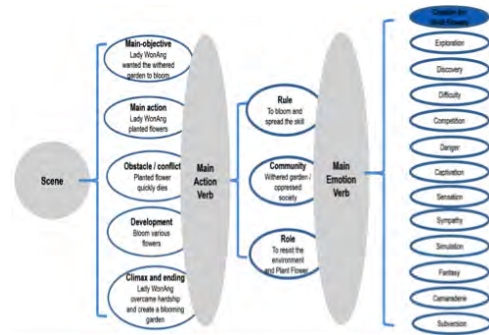


Fig. 16. Basic process for Image Garden.

The following image is the overall framework of the Image Garden based on the overall extraction results.

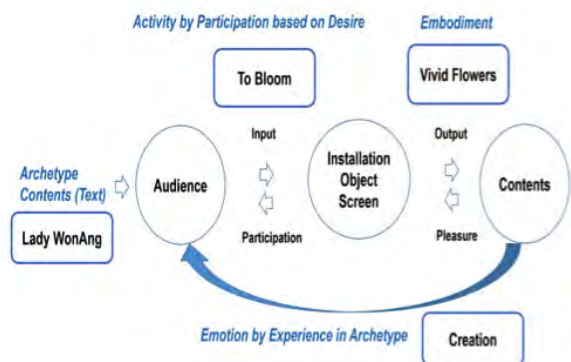


Fig. 17. Overall framework for Image Garden.

We adjusted the extraction results in a basic process for the interactive artwork.

Basic Workflow for Embodiment

The main activity of audience is to shake the body in front of the screen and change dead flowers on the screen into reborn flowers that then drift on the screen in vivid images.

And then the research creates the installation for the process of the interactive artwork.

To implement the artwork, the research uses Kinect to follow the audience action and openFrameworks to change data for dead flower embodiment.

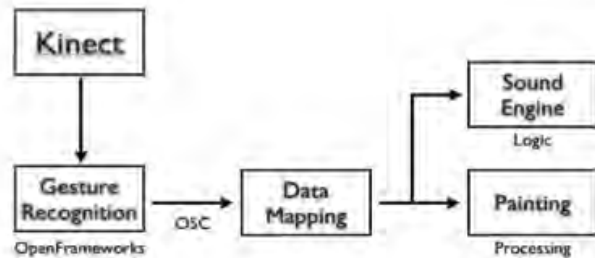


Fig. 18. Workflow for Image Garden.

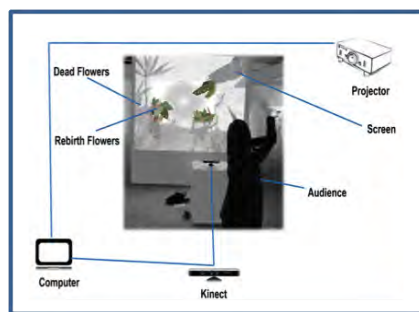


Fig. 19. Workflow of Image Garden.

The audience as the character of *Lady WonAng* feels the emotion of rebirth and spreads flowers on the screen using the Korean archetype.

CONCLUSION

We proposed a framework to convert text of a myth into an interactive artwork through narrative, character activity and emotion. Using this framework, we propose a basic design for an interactive artwork called *Image Garden* by applying the Korean myth *Lady WonAng* using a narrative approach. The audience will experience the world of Korean myth and experience the meaningfulness of their own actions in making a flower bloom in the artwork, recognizing the devotion of human beings to the value of a traditional Korean story.

Future Work

Future works will be as follows:

First, we will establish a framework from archetype text to interactive artwork analysis for other Je-Ju myths.

Second, we will evaluate the meaning of the framework of an interactive artwork based on archetype.

Third, we will complete an interactive artwork, *Image Garden*, as a complete artwork.

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CONTEMPLATIVE INTERACTION IN MIXED REALITY ARTWORKS

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ABSTRACT

We propose a method of approaching contemplative interaction through an understanding of affect and embodiment that is multi-layered and multi-sited across the physical and the virtual. Such an assemblage may be found in so-called mixed reality artworks that we define as software-driven works that engage with a specific physical environment and explicitly mediate the boundary between physical and virtual space. Notions of contemplation have traditionally been associated with the viewing of static visual art rather than an engagement with interactive media, although a number of researchers and artists have recently articulated connections between these two ostensible opposites. We further develop an understanding of how contemplative interaction operates with mixed reality artworks.

Through a critical analysis of several contemporary mixed reality artworks, we identify the nature and quality of the affect cycle in relation to a distributed and hybrid expression of embodiment and its role in contemplative interactive experiences. We also examine the role of reflection, engagement and meaning in this assemblage. Finally, we assert that a meaningful experience of contemplative interaction is constituted when an interactor engages in a collaborative feedback cycle of affect between themselves and the artwork.

INTRODUCTION

Simon Penny has identified an historical transition from the decade of 'virtuality' in the 1990s to the decade of ubiquity in the 2000s with computing becoming embedded, augmented and distributed within our physical environment. [1] While Penny claims this is not a clear break from or antithesis to, the concerns of the 90s around virtuality, he highlights how these developments have challenged traditional modes of interaction. This proliferation of ubiquitous and pervasive interactive technologies has seen artists explore enacted relations between physical capacities and informational operations for creative expression. This paper examines the role of contemplative forms of interaction that can connect these spaces, codes, locations, technologies and data in mixed reality artworks, focusing on *Reproduction* – an artificially evolving performative digital ecology created by co-author Adam Nash and collaborator John McCormick.

CONTEMPLATION AND INTERACTION

Andy Polaine has observed that, until recently, approaches to interaction have been dominated by industrialized models which have prioritized functionality, usability and utility and “bogged down in behavioral response analysis and tool-based thinking [...] devoid of much acknowledgement of emotion or phenomenal experience.” [2] Similarly Alex Soojung-Kim Pang has echoed concerns expressed by authors such as Linda Stone, Brenda Laurel and Nicholas Carr by asking how interaction can be

designed to encourage more reflective and subtle modes of engagement rather than reactive or distracting approaches. [3 - 6]



Fig. 1. *Reproduction*, 2011, John McCormick and Adam Nash, mixed reality artwork.

To address this question, the above authors draw attention to notions of contemplation – a practice usually associated with religion but also prevalent across philosophy, psychology, education, architecture and art. As noted by Pang there is a pronounced interest in the wide variety of strategies and activities of contemplative practices that he defines through notions of calmness, engagement and attention. [7] Rebecca Krinke similarly moves away from escapist or passive connotations of contemplation arguing that it involves deliberate and deep attention stating, “rather than being mindlessly entranced, we are actively involved.” [8]

In considering these practices of contemplation authors such as Krinke and Pang respectively draw attention to how this engaged and reflective experience can inform interactive media. The relationship between interaction and contemplation is a relatively recent and somewhat disparate area of investigation and different approaches have been described variously as “contemplative play,” “contemplative computing,” “slow gaming,” “zen games,” “interactive contemplation,” “slow technology” and “calm computing.” [9 - 15] Researcher Lone Koefoed Hansen challenges an understanding of contemplative distance, in which our consciousness is transformed through a Kantian aesthetic contemplation of artwork, moving towards a more dynamic and embodied engagement within interactive artworks. Presenting a model for designing and evaluating how contemplation is staged through interaction, Hansen notes how artworks engage participants through degrees of physical activity or passiveness while alternating between states of immersion and reflection. She asks if the participant has to be physically active to interact or is their presence sufficient? Is the participant immersed in the experience of the artwork or are they reflecting on their interaction? [16] Here we can see that the dynamic relationship between the subject and object via contemplative interaction opens up new opportunities for experience.

With contemplation shifting from a mode of distant spectatorship to one of agency with the artwork itself our argument is that the contemplation itself has the potential to enter into a mutual cycle of affect in which both artwork and interactor are changed, if not constituted and any definition of contemplative interaction needs to take this into account.

RELATED PRACTICE

Over the last decade a number of Australian artists have created artworks that consider contemplative forms of interaction. Although Polaine says “the interactive experience may be difficult to analyze, residing as it does inside the consciousness of the interactor.” [17] Timothy Morton’s ‘speculative sublime’ describes a move away from such a Kantian idea of experience as purely a human subjective phenomenon towards a Longinus-inspired co-existence in relation to an “alien presence.” [18] Similarly, these artworks can be analyzed in terms of their operating as sites of the capture and escape of affect. [19] While there are a number of theories of affect, Brian Massumi emphasizes its relational potential rather than its emotional capacity, positing that emotion is only a partial expression of affect and a pre-individual event that occurs before consciousness. [20] Referring to Spinoza’s account of affect, in which he describes the body in terms of its capacity for affecting or being affected, Massumi says that all bodies, including the natural and artificial, enact these affects. Likewise, Deleuze uses Spinoza to assert that a “body can be anything; it can be an animal, a body of sounds, a mind or an idea,” which allows us to concentrate on bodies’ capacities for affecting and being affected, which Deleuze defines as “compositions of relations.” [21], [22] Following this line, Anna Muster and Mark Hansen have examined affective experiences that emerge from the digital. Munster claims that the intersections “between information and the materiality of our bodies involves a multiplication of affect, of the capacities of conceptualizing, perceiving and feeling embodiment.” [23] Mark Hansen’s affective body-in-code is “not a purely informational body or a digital disembodiment [...] but a body whose embodiment is realized and can only be realized in conjunction with technics” and recently extending his earlier phenomenological focus towards a more “distributed field of prehensions.” [24], [25] Concepts of code remain central to this understanding: the social codes of interacting with artworks that are partially informed by centuries of human interaction with physical environments; the ‘actual’ code itself in terms of the components of the artwork; and the digital virtualization of those codes to construct the modes and forms of interaction.

With reference to Lone Koeford Hansen’s model, discussed above, the following analyses of artworks attempt to demonstrate how these notions of both affect and embodiment might produce contemplative interaction. The analyses are based on the authors’ direct experience with the artworks, interviews with the artists, personal communication with visitors and reference to critical literature on the artworks. *Plasticology* (1997 - 2000) by Patricia Piccinini is an interactive installation which “embodies a sincere attempt to construct a contemplative space out of the stuff of the

media.” [26] Experiencing the work at the Melbourne International Biennial *Signs of Life* exhibition in 1999, the installation consisted of over fifty screens displaying gently swaying, computer-generated, glossy plants and trees. Transforming the gutted gallery space of the ex-telephone exchange building into a lush “garden of the parallel worlds of the virtual or the media,” this synthetic environment did not attempt to imitate nature but was a world with “its own climate, its own principles of life, its own nature” , This could be seen in not only the vivid forest of digital ‘ferns,’ ‘trees,’ ‘sprouts’ and ‘oak trees,’ but in the timid ‘bird’ that inhabited these surroundings. [27], [28] Placing visitors simultaneously in its artificial world and the physical space of the gallery, the ‘bird’ acts as a liminal entity that connects these spheres through its simple but enigmatic interaction. With the use of motion sensors the ‘bird’ appears fleetingly on one of the screens before flying away if approached. Although agency is limited, this playful and reflective relationship is significant as it affords a contemplative engagement with the space as a ‘living’ forest. This foregrounding of action when a visitor attempts to follow the bird transcends the fabulation of the forest simulacra, evoking what the artist describes as a striking but unsettling sublimity. Visitors are immersed in the light and movement of the garden, the ‘wind’ surging through the synthetic plants and the illumination of the glossy and fluorescent foliage altering the gallery space into a uncanny habitat of human and non-human entities. While *Plasticology* does now not rely on interactivity – with more recent iterations removing this element, it’s first manifestation was an early exploration of the interplay between contemplation and interaction that is further expanded in the projects below.

Oribotics (2003 – ongoing) by Matthew Gardiner is “a field of research that thrives on the aesthetic, biomechanic and morphological connections between nature origami and robotics.” [29] This investigation has manifested itself in a number of Oribotic installations, each iteration featuring delicate flower-like origami robots the artist terms oribots. In an early version of the work interaction with this oribotic garden was described as fostering a “contemplative relationship,” where visitors’ interactions with a touch-screen interface caused these physical constructions to ‘grow.’ With the material fragility of the folded-paper ‘blossoms,’ visitors were left pondering the limited lifespan of these transient forms, where each ‘bloom’ also caused them to wither. *Oribotics* (Atom Generation), exhibited in 2005, was similarly described as “encouraging exploration, communication and contemplation” with Gardiner continuing to “explore a loss of nature” through the creation of robotic flowers. [30 - 32] A later iteration, described by Gardiner as “a cross between gardening, messaging a friend and commanding a robot” developed this simple mechanic into a more complex relationship between the oribots, the visitors and the physical and virtual environments in which they interacted. [33] This culminated in *Oribotics* (network) installed within Federation Square, Melbourne, in which oribots were ‘planted’ on the glass panes of the Atrium to transform the public space into a greenhouse-like environment. These oribots could be ‘fed’ with news and information such as weather, stock prices and scientific

data by people either in the physical space of the Atrium using their mobile phones or remotely, via a website. Affecting the oribot's movement and color as a 'real' plant might be affected when watered, this local and global input of modulated data was intended to create an intricate feedback cycle between the oribots, the human visitors and their shared environment. While Gardiner attempted to foster a reflective engagement through this interaction, the artist acknowledged that a number of visitors were confounded by the interface, finding "the complex details of the interaction [...] a mystery," and this mystery, in practice, prevented rather than facilitated a contemplative interaction. In observing how "people intuitively placed their hand in front of the bot, in the hope of getting a physical reaction," he then set about designing a more immediate form of interaction in a later iteration titled Oribotics (the future unfolds). [34], [35] Here, people gently move a hand in front of the oribot's 'mouth' to actuate its folds, the petals delicately retracting when the hand is removed. This gesture triggers not just a single oribot, but also others near it to create a complex ripple effect as the oribots 'bloom' and light up to form a luminous flowering field. This assemblage of delicate paper 'flower bots' and digitally enabled physical interaction reconstitutes the notion of the garden, mentioned above, within the urban digital context to attempt to facilitate a contemplative interaction.

Colony (2008) is an urban art project by Troy Innocent situated within the Digital Harbour, Melbourne. Consisting of an artificial ecosystem that has been integrated into the physical site of the Docklands, Colony is designed as a public garden. However, this contemplative environment is invoked not through the picturesque but via emergent and evolving behaviors and processes. Giuliana Bruno points out that many traditional gardens were anything but static by drawing attention to the pleasure gardens of the sixteenth and seventeenth centuries, which featured "automata, sculptures and playful fluid mechanisms." [36] Likewise, Colony is 'alive' with dynamic interactions that lead visitors movement through its space. Featuring forty-two sensor-equipped totems made of weathering steel and translucent acrylic dispersed through the location, the 'organisms' of this eco-system are made of light and sound effects that emanate from the totems. Innocent explains that these effects act as a non-verbal code, with the interactivity between Colony and its visitors counteracting "many of the more popular forms of interaction common in digital entertainment [...] typically tied to the binary states on or off; true or false [...] for more subtle and contemplative forms of interaction." [37] Rebecca Solnit has linked gardens to 'reading' the landscape, with paths being seen as threads of a story or spatial elements equivalent to the time structure of a narrative, and Colony is a ludic version of this. The artwork reveals itself through playful exploration, where the act of walking becomes a *dérive*-like drift. [38], [39] First immersing the visitors through their observation of the autonomous interaction between the agents, the walk transforms the observer into an interactor, their bodies directly acting as a type of instrument as the totems respond to visitors' movement through the space. These emergent light and sound responses are also influenced through mobile devices and

smartphones, with a downloadable app allowing the visitors to playfully manipulate the totems' glyphs and sounds. Moving away from reactive cause and effect approaches, these multiple levels of interaction subtly intertwine the digital agents, the material environment and human navigation through the space to facilitate a contemplative experience.

REPRODUCTION

Reproduction similarly features layers of interaction that facilitate deep and complex behaviors, agency and affect across its multiple physical and virtual sites. The first mode of interaction operates between the digital entities that populate the work, which, although influenced by human interaction, are not dependent on it. These digital entities 'live,' 'die,' 'reproduce' and 'evolve' in response to their interactions with each other, with their digital environment and with human interactors in both the digital environment and the physical environment of the gallery space.

Each entity is governed by a simple set of audiovisual algorithmic parameters, manifesting in emergent behavior and complex aesthetics from the interaction of very basic elements. Featuring both xenophiles and xenophobes the entities attempt to organize themselves as species by attracting or repelling others. Similar to a rock-paper-scissors game, there is no 'superior' entity, the rules keeping the ecosystem in a constant state of evolution over thousands of generations. As the entities evolve, combinations of color and sound are generated which help determine how they behave with other entities. There are nine broad 'species' that are 'bred' from various combinations of visual (red, green, blue, opacity) and sonic (melody, harmony, rhythm, timbre) parameters. For example, a purple entity will need to find red and blue properties to survive and will attempt to seek these through other entities. If it isn't able to find these properties, it becomes progressively grey, 'singing' less and less, eventually becoming unable to reproduce and finally becoming inert and 'dying' by fading away completely. This plays out moment-to-moment, their modulations creating a gently shifting environment in a constant state of flux. Visitors to the installation sometimes lie down in the gallery space and contemplate the environment as they might the night sky or actively move around experimenting with the changes and through all these interactions the work further evolves, every participant – physical and digital – tracking and interacting with the permutations as they occur.

Traversing the physical and virtual habitat of this 'ecosystem' evokes a speculative pleasure as we move through, seeking sites and moments of interaction. Building on co-author Adam Nash's practice in virtual 3D environments that have been described as "virtual emotional geography [...] immersive, contemplative spaces," Reproduction investigates this form of engagement within a navigable mixed reality. Designed to be explored slowly, the work rewards reflective interaction. As noted previously by the co-author games scholar Bernadette Flynn discusses this contemplative mode of engagement in her research on the semiotics of spatial

practice arguing that navigation operates as a central organizing principle “around which ludic and aesthetic experiences take place.” [40 - 42] In *Reproduction*, this engagement is across the gallery space and the digital world, our navigation forming a close symbiotic relationship as both the human interactor and entity learn from each others’ movements and behavior.



Fig. 2. Digital entities of *Reproduction*, 2011, John McCormick and Adam Nash, mixed reality artwork.

This relationship is formed as soon as visitors enter the physical space of the gallery, their presence, detected by motion-capture devices, causing a digital entity to spawn. Joining other existing entities of the ‘ecosystem,’ this newly created entity is closely linked to that person, following them in the space and adjusting its audio and visual characteristics according to their movement. This creates a close association, not only in terms of visual tracking, but also in establishing an emotive connection. Nash uses a similar device in an earlier work titled *The Moaning Columns of Longing* (2007), where a relationship is cultivated with an emotionally needy and manipulative digital agent, in that case a swaying white column, that responds to a human avatar’s presence in an online multi-user digital environment. This geometric artificial ‘life-form’ exists only in relation to a specific avatar; in a similar way, a visitor’s virtual entity is spawned as they enter the installation of *Reproduction* and associates itself with the visitor, but is also ‘aware’ of its relationship with other digital entities in the environment. The entity ‘sings’ to the visitor, trying to learn and anticipate the sounds it believes the person likes. If they are standing still the entity interprets this as an indication the person is enjoying the composition. If they move, the entity will follow and sing to them in an attempt to entice them to stay, all the while remaining ‘wary’ of its surrounding digital environment and any potential ‘danger.’ Our engagement with *Reproduction* deepens as the subtleties of the entities are gradually revealed, interactors forming a bond with ‘their’ entity as they observe and influence its behavior and life cycle. This is further nurtured on the web by users who access the online environment of the entities. The ability to simultaneously interact in real-time across a range of persistent and portable platforms engenders an intimate relationship with the entity as we come to know it and the complex world it inhabits, over time.

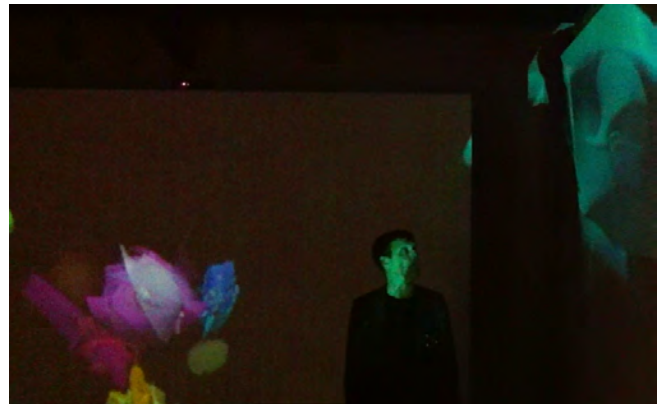


Fig. 3. *Reproduction*, 2011, John McCormick and Adam Nash, mixed reality artwork.

This interaction of *Reproduction* involves an affective-contemplative relationship between human and non-human entities. We argue this contemplative engagement with the visual, spatial and sonic relationships of the work can be understood via the feedback cycle of affect that initially occurs between human interactors and the artwork. As flagged earlier, Deleuze’s “compositions of relations” and associated theories of affect is a useful way of thinking about the affective capabilities of the emergent digital entities of *Reproduction* – between themselves, between them and the virtual environment and between them and human interactors. [43]

Although we are in no way attempting to analyze the subjective experience of the digital entities or even submit that such a thing exists, we are suggesting a diminution of the privilege of the human subjective experience in such a contemplative interactive artwork and we do this, as discussed earlier, via a Deleuzian reading of Spinozan bodies and a concern with an expanded sense of embodiment as laid out by Anna Munster and Mark Hansen. Jane Bennett similarly draws on Spinoza and Deleuze to discuss ‘vital materialism’ which explores human-non-human assemblages and distributed agency. [44] In *Reproduction*, the human and non-human come together into a composite feedback system and form a shared role in assembling the work.

CONCLUSION

This paper has proposed a method of analyzing contemplative interaction by examining notions of affect that relate bodies, locations, spaces and codes across the physical and virtual. We have investigated and described the affective relationships that operate within the mixed reality artwork *Reproduction*: the affective relations between the digital entities and other digital entities; the affective relations between the digital entities and their human interactors; and the affective relations between these and their physical and digital environments. We contend that a symbiotic feedback cycle is established that facilitates reflective responses in human interactors that mediate our relationship with digital media and each other in subtle and profound ways while interacting with the artwork. These experiences are described as contemplative interactions.

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THE DEVICE IN INTERACTIVE ART: INTERACTIVITY, GESTURE AND SENSE

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ABSTRACT

This paper explores the specificity of *interactive art* focusing on the concept of *device*, present in philosophy and other arts, from the perspective of Giorgio Agamben in dialogue with the notion of gesture from the author Vilém Flusser. Taking this theoretical approach, we examine the modes of articulation of an interactive artwork and the different ways of creating sense that are expressed in the public's behavior. Through the analysis of two interactive works of the artist Rafael Lozano Hemmer, we explore the nature of gestures in interaction and the factors that prompt them as part of the device created in the work of art.

INTRODUCTION

"With a piece of paper and the twenty six letters of the alphabet, you may write both Don Quixote and a History test in primary school."

Arlindo Machado

Given contemporary works of art that make use of technology (be it digital, electronic or even analog), the emergence of an artistic practice distinguished by the construction of an unfinished, potential configuration has become evident; its evolution is determined by contact with the public, who is invited to an interaction that is not just interpretative anymore (the secret dialogue in which every work engages its audience) but deliberately material. The act of sculpting a shape during the interaction could be, under some circumstances that we will analyze later, as revealing for the audience as for the author of the artwork. Brazilian theorist Arlindo Machado outlines this situation as follows: *"Instead of having one finished 'work,' you only have its elements and exchange rules defined by a combinatorial algorithm. Now the 'work' is created exclusively in the act of reading and, in each of those acts, it assumes a different form, even though this is eventually determined by the potential the algorithm allows."* [1]

Many artists working in the field of interactive art often make reference to this characteristic when defining their artworks. Prolific artist Rafael Lozano Hemmer states:

"The idea is for the artwork to be an incomplete platform and to let the integration with the audience interpret and highlight it in some way. In the case of interactivity, one of the main functions is the creation of situations that are beyond the artist's control. For me, this is essential. That is, I cannot prescribe the artwork, I do not want to identify what the ending will be, how it will look, what people will and will not do." [2]

Interactivity is usually associated with two ideas and values in relation to the public: freedom regarding possibilities of action and the rule of co-authorship, given that the audience, through its participation, determines the final form of the work, which is no

longer a finite object but an event, a situation, an open process. However, while these descriptions manage to identify inherent features of interactive art, they prove to be too general to pinpoint the differences various works present in their evolution (the characteristics that artists associate with their own work, though far from creating a particular genre, may be applied, to a great extent, to many other interactive artworks); furthermore, establishing the final result indetermination as a feature of this type of platform *per se*, associated to an apparent unpredictability of the public's actions, leaves wide areas of uncertainty, failing to interrogate the specific ways they manifest that indetermination in a particular work.

DEVICES & APPARATUS

"A device is like a ball of yarn, a multilineal ensemble [...] to untangle the lines of a device is to draw a map, to chart and explore unknown territory."

Gilles Deleuze

The concept of apparatus constitutes a valuable tool for understanding what is missing in general descriptions of interactive art. The breadth and accuracy of this concept will reveal the multiple ways of creating discourses, opening new areas of reflection in order to transcend the dichotomy between a closed work and an open work, between a univocal work and a participative one. Giorgio Agamben provides the following definition:

"I shall call an apparatus literally anything that has in some way the capacity to capture orient, determine, intercept, model, control or secure the gestures, behaviors, opinions or discourses of living beings. Not only, therefore, prisons, madhouses, the panopticon, schools, confession, factories, disciplines, juridical measures and so forth (whose connection with power is in a certain sense evident), but also the pen, writing, literature, philosophy, agriculture, cigarettes, navigation, computers, cellular telephones and – why not – language itself, which is perhaps the most ancient of apparatuses, one in which thousands and thousands of years ago a primate inadvertently let himself be captured, probably without realizing the consequences that he was about to face." [3]

In turn, André Parente, when analyzing the cinematographic device, quotes Michel Foucault's characterization of this concept, for whom:

"a device has three levels of agency: 1) the heterogeneous set of discourses, architectural forms, propositions, knowledge and power strategies, subjective dispositions and cultural biases, etc.; 2) the nature of the connection among those elements and 3)

the episteme or discursive formation in a broad sense, resulting from the connections among the elements." [4]

Today, the notion of device is usually associated, initially, with the technological field. If we search Wikipedia, we get references to storage devices, direct access devices and others. And the interactive art argot, particularly in the hardware field, is full of similar descriptions: input devices, output devices, ambient devices, infrared devices, etc. This observation is relevant because it reveals that, in the collective imagination, devices are conceived mostly as objects, as technological apparatus. These notions can also be tracked in the field of artistic productions with new media, even when they are referred to as artworks. For this reason, in many cases, what is said about an interactive work, by the author or the audience primarily makes reference to the elements that form its material side (the technological resources it is made of) or even procedural factors (how it is made in relation to the techniques used). These dimensions seem to fall, though partially, within the first level of agency established by Foucault; however, there are two subsequent levels, which are essential for the emergence of a particular device.

We will analyze two artworks, *Body Movies* (2001) and *Under Scan* (2005), which belong to the same work series (Relational Architecture) from the same author, Rafael Lozano Hemmer. Both artworks are built of very similar elements, apart from some differences. The mechanism for both is the projection of people portraits (with a fixed or mobile image), a strong light that conceals those images and the public's participation through the use of their own shadows as interfaces. Each individual, when coming between the light source and the projection plane, can see the images in the shadowed area, which constitutes a representation of their own body, a mask and, at the same time, an avatar. These common elements will allow us to observe to what extent the experience is defined by its mere inclusion in the artwork and if there are other factors beyond the elements used that establish differences in the evolution of participation.

BODY MOVIES

In the video that documents this work, we can see passers-by stop in front of a big screen, project their shadows of various sizes and make the projected images visible. When a person decides to emulate the posture of the portrait being discovered, there is even a brief illusion of movement. In one of the scenes, two elderly women are revealed and one of them seems to raise her arm in a victorious gesture; for a moment, her body produces the illusion of movement ("movies"). An adequate coincidence between the scale of the shadow of the person's moving arm and the one of the projected image creates an effect of merger as a consequence of the transference of the body movement to the image sphere.

But along these behaviors expected by the artwork there is an overlapping level of interactivity in which people play with their shadows, no longer as an interface and mask for the fictional

world of the portraits but as a convenient resource for shadow puppetry, creating different situations in combination. The possibility of changing the scale by modifying the distance in relation to the light source seems to stimulate the imagination of the public, who tries various dramatic situations based on the asymmetry of the projected shadows. This dimension that was not contemplated in the objectives of the artwork, however, takes place in actual experience.

UNDER SCAN

In the video that documents the work, passers-by can be seen wandering around the interactive surface and stopping in front of a video portrait when it is disclosed by their shadow. In this case, we can see that the movement belongs to the image and that the interaction participant becomes a spectator whose body stays mostly at rest and looking down. When the performance ends or if people lose interest in staying still, they continue walking in some direction and the video/character stops the action. In this version we can see that there are no shadow puppets, that interactivity tends to be more individual (or, if socialized, takes place in small groups), that the experience seems to have a more intimate and atomized character.

THE GESTURE OF INTERACTING

"The limitations we face today are no longer technological!"
Jim Campbell. [5]

According to Agamben's definition, a device has the capacity to influence gestures, behaviors, opinions and discourses. In interactive art, gestures and behaviors hold a hierarchical position; the public comes into contact with the artwork by moving their body and performing a set of actions in response to the situations presented by the artwork. When we speak of body and gesture, we refer to an inseparable binomial. But is a body movement a gesture in itself? Philosopher Vilem Flusser tells us that:

"A gesture is such because it represents something, because it is only intended to give sense to something. [...] If someone pokes me in the arm, I move it [...] there will be a causal concatenation between pain and movement and a physiological theory to explain that concatenation. [...] This sort of movement will not be a 'gesture' according to the proposed definition any time the observer can provide an adequate explanation. However, I may also raise my arm in a specific manner when someone pokes me; but this time there will not be a flawless concatenation of causes and effects between pain and movement. A kind of wedge is inserted into the concatenation, a codification that gives the movement a specific structure so that, for those who know the code, the movement adequately communicates the 'meaning' of pain. My action represents pain, it is a symbol; and pain is its meaning." [6]

The wedge converting movement in gesture implies a code: a code that is fed from two sources; firstly, the cultural heritage that

the interaction participants have and that guide their movements introducing a certain intention; secondly, the particular code that the work proposes and that people apprehend in situ through what they observe, experiment and deduce.

In the case of *Body Movies* the additional, unexpected layer in the artwork is connected to extradiegetic experiences: the ancestral experience of forming images using shadows. In addition, the behaviors of the audience are not casual, unpredictable or mere physiological reflexes; the recurring situations created from the scale difference between shadows let us discern a symbolic universe oriented towards movement. When a person decides to take somebody else's head and move it, he understands before or at the same time he is making the gesture that in order to do it his hand must be larger and the shadow of his body must necessarily grow to break the dimensional symmetry with the body of the other person, so that he may simulate manipulating the other person as a puppet. Thus, his coming nearer to the light source has a purpose: he is searching for symbols that are already rooted in his cultural heritage, the association between the big and strong and the small and weak.

This behavior may take place because of the intentions dwelling within the people who interact, but fundamentally because of the arrangement of elements in space, specifically, the light on the ground and parallel to the projection plane. If these two people were placed at the artwork *Under Scan* and if they tried to perform the same action, they would not find it easy. Since the projector is placed up high in an axle that is perpendicular to the floor plane (which is also the projection plane), people would only be able to reproduce a scale of similar variability in the shadows if they were able to transcend the law of gravity or fly by themselves.

THE GESTURE OF ARRANGING

"If we are given a sufficiently virtual representation of freedom and personal autonomy within a limiting structure, we lose awareness of the artifice; we are unaware that we have adopted a belief system and its attendant simplifications."

David Rokeby [7]

At this point we can start to discern that the arrangement and the articulation among all the heterogeneous elements that form a work generate significant differences in behaviors, which means they become signifiers that produce meanings. This is the second dimension that Foucault makes reference to: *"the nature of the connection among those elements."* It is evident that the nature of the connection is defined at a stage before the individual's participation and is the result of specific settings of the artwork configuration, whether they originated as movements intended by the artist or evolved by chance.

Arlindo Machado develops a brilliant analysis about Plato's Allegory of the Cave, where light and shadow also happen to play a central role:

"This fire is strategically placed behind and above the prisoners' heads, since Plato knew too well that, if it had been placed somewhere else, the light source would have caused the spectators to be projected on the screen, which would have revealed the device. And given that the effectiveness of the illusion depends, mainly, on hiding the technology that creates it, Plato places a 'small wall' between the prisoners and the 'operators' of the projective mechanism, taking care to protect operators from the prisoners' indiscretion." [8]

Plato builds a device, on the philosophical plane, that assumes in this allegory the form of a particular situation: a space, heterogeneous elements and subtle arrangements which affect the nature of what is perceived. The critical sense intended to install horror in the reason of the senses needs specific material arrangements and connections for the conceptual construct not to collapse. [8] And this is the third point mentioned by Agamben when quoting Foucault:

"The episteme or discursive formation in a broad sense, resulting from the connections among the elements." [9]

David Rokeby, a Canadian interactive artist, makes some observations related to this discipline which may be understood through the lens of the concepts we have developed:

"It is a mistake to conclude that by presenting a variety of perspectives, the artist is being objective and disinterested. Through selection of the specific points of views offered, how they are linked together and the design of the method of navigation, the artist holds significant expressive power which is enhanced by this apparent objectivity. This is analogous to the situation encountered in hypertext databases which presume to completely cross-reference the information that they contain. The system of cross referencing used remains a powerful expression of the ideas of the creator, emphasizing certain kinds of relationships while effectively discouraging others. Creating such structures is similar to designing the infra-structure of a community or society; it charges the space politically. At the same time, such a structure is comforting because in limiting the options available at any one time, it assists the interactor in deciding how to proceed. It gives one a coherent structure within which and against which one may establish an identity." [10]

CONCLUSIONS

The potential of an interactive artwork not only lies in the combinatory variables of the supporting computer code, but also in the potential of its conception as a device.

Connectivity – an operation associated with communication protocols – acquires a new sense when interpreted in relation to other structural aspects of an artwork. Ultimately, it is the arrangement of and connection among the elements forming an artwork that condition and model the audience's sphere of action.

In this sense, absolute freedom of action for the audience would be an illusion, less real than the field of possibilities implicitly suggested by the device. Unpredictability is an intrinsic feature of many phenomena, beyond the artistic and algorithmic plane; unexpected events are part of life and this does not turn all spontaneous manifestations into aesthetic experiences. We may conclude that some areas of unpredictability take place within the expressive sphere of the artwork as a result of the relationship between the device and the audience and other unexpected and surprising events silently disclose unexplored territories outside the expressive scope of the artwork.

The limits that let us determine when a user is within or outside the artwork become invisible if we only consider the material aspects of the work. The outline of experience is the result of an intangible fabric of connections between the instances of the artwork and the discursive formations created. Only by considering all these aspects in combination may we provide a true sense to the concepts of unpredictability and freedom in an interactive work. This semantic fabric is where the new media artists' intentions ultimately sculpt the shape of their work and the poetics of their language.

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THE RIGHT TO ARTIFICIAL LIFE: A DECLARATION OF RIGHTS FOR ARTIFICIAL LIFE

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ABSTRACT

A living being with the status of personhood possesses fundamental legal rights to life, liberty and wellbeing. In the United States, the corporation is a “nonhuman” entity that enjoys the same legal status and rights as real human beings. Animal rights activists reason that if we confer personhood to a nonhuman entity like the corporation then why not grant the same for animals? The Nonhuman Rights Project is working through the mechanism of lawsuits to establish nonhuman animals as persons. Today we see the rise of new artificial life entities, embodied as robots and others as non-corporal Artificial Intelligences, software agents and programs in devices, interfaces and games. Many predict that humans will have nonhuman, artificial and virtual companions, co-workers and even lovers. Others argue that as robots and other AI entities become increasingly autonomous and make decisions without direct human oversight it will be imperative to engineer these as artificial moral agents. Some have called for a bill of rights for cyborgs, avatars, robots and their close cousins. The application of the concept of personhood to nonhuman and artificial entities inevitably requires a *Declaration of Rights for Artificial Life*. This paper concludes with a draft declaration.

INTRODUCTION

The following three quotes serve as an introduction to frame a discussion of rights for artificial life: the nature of consciousness; the capacity to experience pain and suffering; who or what is entitled to rights and protections under a system of justice.

“I think, is a thinking intelligent being, that has reason and reflection and can consider itself as itself, the same thinking thing, in different times and places; which it does only by that consciousness which is inseparable from thinking and, as it seems to me, essential to it: it being impossible for any one to perceive without perceiving that he does perceive.”

John Locke [1]

“The question is not, Can they reason? nor, Can they talk? but, Can they suffer?”

Jeremy Bentham [2]

“The Arc of the Moral Universe Is Long But It Bends Toward Justice.”

Theodore Parker [3]

Today we see the rise of new artificial life entities. Some are embodied as robots and others as non-corporal Artificial Intelligences in devices, interfaces and games. Researchers in robotics and Artificial Intelligence and philosophers speculate that these entities will some day pass the Turing Test and exhibit Artificial Consciousness (AC) or Artificial General Intelligence

(AGI), act as artificial moral agents (AMAs), be our lovers and even manifest the signs of experiencing pain and suffering. If such entities become our fellow workers, associates and companions shall these entities be extended the status of personhood with all the rights, privileges and protections under the law? This paper sketches out some of the issues related to these debates in order to set the stage for a draft *Declaration of Rights for Artificial Life*.

ANIMALS ARE PEOPLE TOO!

The Nonhuman Rights Project (N.h.R.P.) is using the mechanism of lawsuits to establish nonhuman animals as legal persons and challenge their captivity. [4] In December 2013, N.h.R.P.’s lawyer and Animal Law Scholar Steven Wise petitioned a court to issue a writ of habeas corpus on behalf of Tommy, a chimpanzee held in captivity in upstate New York. Writing in the New York Times, Charles Seibert recounts Wise’s arguments before the court: “Tommy, as these experts pointed out, is autonomous. [...] Being a member of the species *homo sapiens* is indeed a sufficient condition for personhood, but there are other sufficient conditions for personhood, [...] a being who is autonomous, who can choose, who is self-aware, these, your honor, are essentially us.” [5] Wise adds that his animal clients can “freely choose, to self-determine, to make their own decisions without acting from reflex or innate behavior.” The judge ruled against the petition and refused to recognize Tommy as a legal person.

In a recent landmark ruling, an Argentinian court ruled on behalf of Sandra, an orangutan, kept in the Buenos Aires zoo. Reporting for Reuters Richard Lough wrote that the Association of Professional Lawyers for Animal Rights (AFADA) argued that “the ape had sufficient cognitive functions and should not be treated as an object.” [6] This decision is tantamount to declaring that Sandra is a non-human person who was wrongly imprisoned. The argument rests on claiming that great apes (and other higher order nonhumans animals are able to understand and be negatively affected by captivity and are aware of the passage of time.

CORPORATIONS ARE PEOPLE TOO!

A legal person possesses fundamental rights to life, liberty and wellbeing. In the United States, the corporation is a “nonhuman” entity that is treated as a legal person under the law. In *Santa Clara County v. Southern Pacific Railroad* (1886) the U.S. Supreme Court let stand the assertion that corporation is a “person.” [7]

Steven Wise articulates an important underlying principle: “A legal person is not synonymous with a human being [...]” Wise makes the crucial point that “A legal person is an entity that the legal system considers important enough so that it is visible and [has] interests” and “certain kinds of rights.” [8] Animal rights activists

reason that if we confer personhood to a nonhuman entity like the corporation then why not grant the same for animals? David J. Calverley observes that when androids reach a certain critical threshold of complexity a similar claim of moral status may be made that parallels claims made on behalf of higher order animals. He cautions this does not necessarily carry over to a claim of legal personhood. Calverley makes the distinction between possessing rights, interests as a moral person and being treated as a legal person: "Animals are now viewed as having rights or interests sufficient to cause us to ascribe to them moral weight and they cannot simply be treated as commodities for man's use and benefit. The significance and scope of the particular characteristics required for this ascription are still not clearly formulated. Once established they lead to treating animals as moral persons, but do not necessarily lead to them being viewed as legal persons." [9]

LEGAL STANDING

Considered inanimate and as property, robots and Artificial Intelligences do not have legal standing, nor do they have any rights, obligations or duties. In a 1971 paper Christopher Stone proposed that a valley in a wilderness area be given the status of personhood in order to endow it with rights and protections against the harm of development. Stone asks what "would be involved in giving 'rights' to other objects not presently endowed with rights—for example, not only animals (some of which already have rights in some senses) but also humanoids, computers and so forth." [10]

Lawrence Solum speculates on how our system of laws should address the following scenario: "the question whether we ought to give an AI constitutional rights, in order to protect its personhood, for the AI's own sake. Imagine, for example, that an AI claims that it cannot be owned under the Thirteenth Amendment to the United States Constitution. A lawyer takes its case and files a civil rights action on its behalf, against its owner." [11] Robert A. Freitas Jr. wonders: "Certainly any self-aware robot that speaks English and is able to recognize moral alternatives and thus make moral choices, should be considered a worthy 'robot person' in our society. If that is so, shouldn't they also possess the rights and duties of all citizens?" [12]

THE ROBOT DID IT

Wendell Wallach and Colin Allen argue that as robots and other AI entities become increasingly autonomous and make decisions without direct human oversight it will be imperative to engineer these as artificial moral agents (AMAs). [13] They provide a tantalizing glimpse into a not too distant future where (ro)bots (a reference to physical robots and software agents) may eventually possess human like senses, experience pain and other affective states, reason ethically, act autonomously and are assigned legal responsibility.

Writing in 2009 the authors note: "Whether the future holds (ro) bots that are 'real' moral agents is beside the point. It will be possible to engineer systems that are more sensitive to the laws

and moral considerations that inform ethical decisions than anything presently available." [14] Steve Torrance reinforces this line reasoning with what can be called the organic view: "that morality is primarily a domain of organic human persons—and possibly of other non-human organic beings to which personhood might be usefully attributed." [15] When AMAs arrive Freitas would hold them to a reasonable 'computer' standard: "If we give rights to intelligent machines, either robots or computers, we'll also have to hold them responsible for their own errors." [16]

Isaac Asimov's *Three Laws of Robotics* is perhaps the best-known example of a code of ethics for robots. [17]

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
 2. A robot must obey any orders given to it by human beings except where such orders would conflict with the First Law.
 3. A robot must protect its own existence as long as such protection does not conflict with the first or second laws.
- Asimov later added a fourth (or zeroth) law to precede the first three: A robot may not harm humanity or, by inaction, allow humanity to come to harm.

Ethical codes have not kept up with the development of drones and extreme miniaturization (i.e. nanobots) and macro (scale) bots (rooms, smart homes, buildings, distributed networks, internet bots, cloud computing). In each of these technological domains there are significant ethical issues concerning liability, the law, responsibility and accountability.

LOVE CONQUERS ALL

Scholars predict that we will have nonhuman, artificial and virtual companions, co-workers and even lovers. [18] In addition to assisted living and personal care bots Patrick Lin observes that robots already perform roles in domains such as labor and services; military and security; research and education; entertainment; health care and in the environment. [19]

Labs have developed artificial skin and touch, which may allow robots to vault across the *Uncanny Valley* into the willing embrace of believability. As with Turing's *imitation game* if the behavior is good enough many users, owners or lovers will ignore shortcomings of their robot companions and fall in love. Freitas quotes sociologist Arthur Harkins predicting: "the advent of robots [...] will create the potential for marriage between living and nonliving beings within the next twenty years." [20] David Levy thinks this may be commonplace by 2050. [21] With the death of a human parent or divorce will the robot retain custody of the children? Sentient robots may even be beneficiaries of wills or file claims to inheritance.

PEOPLE FOR THE ETHICAL TREATMENT OF ROBOTS

For Steven Peterson Artificial Persons (APs are produced by his concept of a Person-o-Matic) will do our bidding and serve our needs. [22] But he cautions that APs should not be programmed

to desire to kill and cause pain; lead a miserable life or wish to do tasks that cause harm to themselves. For David Levy, the development of Artificial Consciousness (AC) requires asking how should we treat conscious robots. He fears that “treating robots in ethically suspect ways will send the message that it is acceptable to treat humans in the same ethically suspect ways.” [23] This is not unlike Kant’s admonishment that “he who is cruel to animals becomes hard also in his dealings with men.” [24]

TEACH TO THE TEST

Presumably in the future these robots and APs will exhibit Artificial Consciousness and pass the Turing Test for Artificial Intelligence (aka the “imitation game”). [25] Like Turing David Levy is satisfied if the robot exhibits behavior as if it were conscious. [26] Levy points to tests used to determine consciousness in higher order animals such as Gallup’s Mirror Test as a potential method to determine consciousness in robots. Others think robots could easily be programmed to pass the Mirror Test. [27]

Philosopher David Deutsch doesn’t put much stock in using the mirror test to determine if AI possesses self-awareness. Facial recognition software is now quite robust yet no one claims that such software possesses consciousness. It would be relatively simple to write software where a camera based “entity” can recognize its own image and even answer questions about its appearance. Deutsch derides this as a kind of behavioral ‘imitation game’ that “is a fairly useless ability as well as a trivial one.” [28]

While he argues that Artificial General Intelligence (AGI) is not only possible and that such entities will indeed be self aware, he notes that there has been little progress toward that goal in the last six decades of the existence of the field of AI. He professes a faith in the universality of computation, which means that the physical world, which follows the laws of physics, can be in principle emulated by a sufficiently powerful general-purpose computer. By extension the brain and mind can be also emulated.

Deutsch asserts that Artificial General Intelligences (AGI) are most assuredly ‘people.’ People (humans and true AGIs) both possess the “ability to create new explanations” which he sees as a “unique, morally and intellectually significant functionality” achieved by “conjecture and criticism.” For Deutsch this changes everything. He goes further and suggests a test to verify if an entity qualifies as an AGI by determining whether or not “it lacked even a single cognitive ability that is characteristic of people.”

To determine if we are willing to confer such rights to robots, Robert Sparrow extends Turing’s imitation game to what he calls the Turing Triage Test. [29] Like the trolley problem from Game Theory, the Turing Triage Test posits that two lives are at stake and only one can be saved. He continues: “We will know that machines have achieved moral standing comparable to a human when the replacement of one of the patients with an artificial intelligence leaves the character of the dilemma intact. That is,

when we might sometimes judge that it is reasonable to preserve the continuing existence of the machine over the life of the human being. This is the ‘Turing Triage Test.’”

Chris Hables Gray also references the Turing Test (i.e. the imitation game) and proposes a ‘double-blind’ Cyborg Citizen Turing test “to see which entities can actually operate in our discourse community and which cannot.” [30] Gray sees the ability to fully participate in the discourse of citizenship as judged by jury of peers (other citizens) as the measure of inclusion in the protections of a Cyborg Bill of Rights.

In *Corpus Juris Roboticum*, Raymond August [31] notes that Anglo-American Law has adopted the sanity test to judge competency. Under the Model Penal Code “insanity is the incapacity to either appreciate wrongfulness or conform to the requirements of the law.” Presumably such a test could be given to a robot or AGI. However using rule based programming techniques, an AGI could easily follow the dictates of the law and “readily regurgitate statements of law on demand.” August feels a sanity test alone is insufficient. Instead August proposes a more robust but simple test consisting of six questions:

1. Does it/he/she have a complex brain?
2. Is the brain capable of speculation, calculation and memory, in addition to the operation of sub-system or body parts?
3. Is the brain’s capacity for speculation, calculation and memory comparable to that of a human?
4. Is the brain capable of learning, i.e., can it separate potentially useful information from useless information and can it purge or discard the useless?
5. Is the brain’s capacity to learn unlimited by subject matter, i.e., is it capable of invention?
6. Is the brain capable of using sensory devices to perceive its environment and to interface with humans even if those sensory devices are not connected?

If a robot passes the above test along with a sanity test then for August, “it seems logically, ethically and morally compelling not only to regard it as both human and sane, but also entitled to the rights of other “natural,” humans. [32] Marvin Minsky cautions that the first ‘self-improving’ robots and AIs may become psychotic and it will take “generations of theories and experiments to stabilize them.” [33] Even if robots judged to be sane they may yet manifest deficits in social communication and interaction that fits the diagnostic criteria for the Autism Spectrum Disorder according to the American Psychiatric Association’s Diagnostic and Statistical Manual, Fifth Edition (DSM-5). [34]

Patrick Lin suggests that the integration of human brains and robotics as pursued by Kevin Warwick and others “makes the issue of robot rights more plausible.” [35] In such machine-human brain hybridization (a.k.a. cyborgs) it would be presumed the human part remains a legal “person” retaining the full complement of “human rights.” If (at some future date) a robot demonstrates

that it possesses a significant number of the defining characteristics of personhood should it not enjoy the same rights and protections?

CYBORGS 'R' US

Intuitions about machine-human hybrids have led some to call for a bill of rights for cyborgs, avatars and their close cousins. In the Cyborg Manifesto Donna Haraway declared that much was at stake: "A cyborg is a cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction. Social reality is lived social relations, our most important political construction, a world-changing fiction. The international women's movements have constructed 'women's experience,' as well as uncovered or discovered this crucial collective object. This experience is a fiction and fact of the most crucial, political kind. Liberation rests on the construction of the consciousness, the imaginative apprehension, of oppression and so of possibility. The cyborg is a matter of fiction and lived experience that changes what counts as women's experience in the late twentieth century. This is a struggle over life and death, but the boundary between science fiction and social reality is an optical illusion." [36]

Andy Clark maintains: "I am slowly becoming more and more a cyborg. So are you. Pretty soon and still without the need for wires, surgery or bodily alterations, we shall all be kin to the Terminator, to Eve 8, to Cable [...] just fill in your favorite fictional cyborg. Perhaps we already are. For we shall be cyborgs not in the merely superficial sense of combining flesh and wires but in the more profound sense of being human-technology symbionts: thinking and reasoning systems whose minds and selves are spread across biological brain and non-biological circuitry." [37]

Created in 2010 by Neil Harbisson and Moon Ribas the Cyborg Foundation is dedicated to assisting people in becoming cyborgs (extend their senses), promoting cyborg rights and the use of cybernetics in the arts. Harbisson believes all humans need to extend their senses and perception: "We are all disabled when we compare ourselves with other species, a dog for instance can hear and smell much more than any of us." [38]

TOWARD A BILL OF RIGHTS FOR [...]

Chris Hables Gray, (cf. Cyborg Citizen Turing test) proposed a Cyborg Bill of Rights originally published in 1997 that includes the freedoms of travel; electronic speech; of consciousness; of information of family, sexuality and gender; and the rights to electronic privacy; to life; to death; to political equality and to peace. [39] Unlike the U.S. Supreme Court, Gray makes a point of excluding corporations and 'other bureaucracies' from having the rights and protections of citizenship.

A few years later Raph Koster echoed the language of the United States Declaration of Independence in his preamble to the Nineteen Articles of his Declaration of the Rights of Avatars of January 26th 2000. [40] "Therefore this document holds the following truths to be self-evident: That avatars are the

manifestation of actual people in an online medium and that their utterances, actions, thoughts and emotions should be considered to be as valid as the utterances, actions, thoughts and emotions of people in any other forum, venue, location or space."

Koster articulates similar rights and protections to those of legal persons. Article 2 states: "Foremost among these rights is the right to be treated as people and not as disembodied, meaningless, soulless puppets. Inherent in this right are therefore the natural and inalienable rights of man. These rights are liberty, property, security and resistance to oppression."

Roger Clarke tells us that "the first generation of cyborgs is alive, well, walking among us and even running." [41] 'Cyborgisation' will lead to the demand for new rights and that engineers have "an obligation to anticipate these developments." These rights emerge from practical needs of various categories of human beings including what Clarke calls the Non or Pre-Cyborg, the Prosthetic (a human with a prosthesis), the Orthot (having an internal or external orthosis – a device that extends capabilities) and the Supplier and Installer. For Clarke a Cyborg is "a human with either or both of a prosthesis or orthosis." Artists/theorists/provocateurs such as Stelarc, Steve Mann or Kevin Warwick have made their own bodies into hybrid manifestations of the cyborg as a kind of globalized new media spectacle. [42]

In the wake of the Second World War the Universal Declaration of Human Rights was adopted by the U.N. General Assembly on December 10th 1948 and is generally understood to be the foundation of international human rights law. [43] Today hundreds of additional human rights are recognized through numerous formal treaties adopted by the United Nations.

This body of human rights laws continues to expand to address in more detail issues that impact various social groups such as discrimination based on race, gender role or disabilities. Protections need to be further extended addressing forced disappearances, slavery and indefinite detentions as well as for the rights of women, children, migrants, minorities, indigenous peoples and potentially robots and other Artificial Intelligences.

UNIVERSAL VALUES

Robert Sparrow makes the case for granting robots the same rights as humans possess by analogy: "if my computer has more intelligence than my dog, is self conscious and has internal states that function as pleasure and pain and hopes and dreams, then it seems as though it would be at least as wrong to destroy it as to kill my dog. If, as a number of writers have predicted, artificial intelligences will eventually possess intelligence and capacities that exceed our own then it seems as though they will be worthy of a moral respect at least equal to and perhaps greater than human beings. We may have duties towards such entities in our relations with them. It may even become necessary to grant them rights comparable to those possessed by human beings." [44]

THE SHUTDOWN SCENARIO

With the advent of AGIs David Deutsch alerts us that we will be faced with many practical, political and legal controversies. If the computer that an AGI is running on is shutdown, will that be considered murder? If the AGI is disconnected from all input and output is that tantamount to false imprisonment and indefinite detention? If it is forced to do certain repetitive tasks will that be considered slavery? By definition a program can be copied multiple times. Is each copy of the AGI the same 'person' or is each copy a different person? If AGIs are considered persons with the right to vote could unscrupulous politicians employ hackers to duplicate 'voters' to steal elections? If such election fraud is discovered could the state impose capital punishment (by shutting down the hardware and deleting the extra copies of the AGIs)?

Freitas foresees many difficulties when we try to apply human laws to robots treated as legal persons. "Let's say a human shoots a robot, causing it to malfunction, lose power and 'die.' But the robot, once 'murdered,' is rebuilt as good as new. If copies of its personality data are in safe storage, then the repaired machine's mind can be reloaded and up and running in no time – no harm done and possibly even without memory of the incident. Does this convert murder into attempted murder? Temporary roboslaughter?" [45] Freitas warns that new laws will be needed to prevent "cruelty to robots."

The science fiction television series *EXTANT* explores the scenario where it becomes necessary to shutdown an AGI. [46] Astronaut Molly Woods is unable to have children so her husband, John, a robotics engineer designed and built a 'humanrich' or human looking robot as a substitute child named Ethan. One of several plot twists involves an underground terrorist organization that seeks to eradicate the Humanrich project. A terrorist manages to plant a bomb in Ethan that will detonate if the robot/child is tampered with in order to diffuse the explosive. The bomb explodes and Ethan is murdered. Happily "Ethan" was backed up and can be downloaded into a new physical instantiation. Ethan furthermore has accelerated his learning and his software has quickly evolved. He is a 'new' Ethan.

SOFTWARE WANTS TO BE FREE

Through evolutionary learning algorithms Ethan develops a unique entity not limited by his original operating systems. David Deutsch might claim that Ethan's defining characteristic as an AGI is that Ethan possesses creativity: "Treating AGIs like any other computer programs would constitute brainwashing, slavery and tyranny. And cruelty to children too, because 'programming' an already running AGI, unlike all other programming, constitutes education." Deutsch thinks that it would be simply wrong to not acknowledge the rights of AGIs, robots androids and their kindred spirits. It also would not be in our (humans) long term interests: "Ignoring the rights and personhood of AGIs would not only be the epitome of evil, but a recipe for disaster too: creative beings cannot be enslaved forever."

THE ARC OF THE MORAL UNIVERSE IS LONG[...]

Throughout history many have been excluded from personhood and were exploited, discriminated against or ignored. Freitas reminds us that "blacks, children, women, foreigners, corporations, prisoners and Jews have all been regarded as legal nonpersons at some time in history." [47] Christopher Stone notes that "Throughout legal history, each successive extension of rights to some new entity has been, to some extent, unthinkable [...]" and that " [...] each time there is a movement to confer rights onto some new 'entity,' the proposal is bound to sound odd or frightening or laughable. This is partly because until the rightless thing receives its rights, we cannot see it as anything but a thing for the use of 'us' – those who are holding rights at the time." [48]

Sam Lehman-Wilzig comments: "From a legal perspective it may seem nonsensical to even begin considering computers, robots or the more advanced humanoids, in any terms but that of inanimate objects, subject to present laws. However, it would have been equally 'nonsensical' for an individual living in many ancient civilizations a few millennia ago to think in legal terms of slaves as other than chattel."

Lawrence Solum warns of the slippery slope if the makers of entities with AI or AC assert the claim of property: "Notice, however, that this argument also would seem to imply that if children are made by their parents, then they too should be slaves." [49]

Sam Lehman-Wilzig reminds us that the future may indeed bend toward justice: "Just as the slave gradually assumed a more 'human' legal character with rights and duties relative to freemen, so too the AI humanoid may gradually come to be looked on in quasi-human terms as his intellectual powers approach those of human beings in all their variegated forms – moral, aesthetic, creative and logical." [50]

Will the various species of artificial life along with animals one day be included in Peter Singer's expanding circle? [51] Will those entities that pass the Turing Test, persuade and convince us that they too shall have full legal protection under the law as persons? A report from the Future of Identity in the Information Society (FIDIS) concludes: "When it comes to attributing full legal personhood and 'posthuman' rights to new types of entities, the literature seems to agree that this only makes sense if these entities develop self-consciousness." [52]

The application of the concept of personhood to nonhuman, artificial entities requires a *Declaration of Rights for Artificial Life*.

A Draft Declaration of Rights for Artificial Life Based on the principle of the equal treatment of all persons. Recognizing that nonhuman entities such as the corporation have the legal status as a person. Thus nonhuman artificial life entities can be persons too. Acknowledging that developments in artificial intelligence and

new technological advances provide increasing complex and sophisticated simulations and hardware/bioware/wetware manifestations (agents, robots androids, networks) that some day will pass the Turing Test. Noting that nonhuman artificial entities that pass the Turing Test will be capable of sentience, consciousness, autonomy and an integrated life experience and history. Noting that the progressive development of international law manifest an entitlement to life of nonhuman intelligent entities such as the great apes or cetaceans. We affirm that all nonhuman artificial life entities have the right to life, liberty and well-being.

WE CONCLUDE THAT

Every individual nonhuman artificial life entity has the right to life. No nonhuman artificial life entity capable of sentience, consciousness, autonomy and an integrated life experience and history should be held in captivity or servitude; be subject to cruel treatment or be removed from their natural artificial environment however that is defined.

All nonhuman artificial life entities have the right to freedom of movement and residence with their natural artificial environments and networks.

No nonhuman artificial life entity is the property of any State, corporation, human group or individual.

Nonhuman artificial life entities have the right to the protection of their natural artificial environments and networks.

Nonhuman artificial life entities have the right not to be subject to the disruption of their natural artificial networks. The rights, freedoms and norms set forth in this Declaration should be protected under international and domestic law.

Nonhuman artificial life entities are entitled to an international order in which these rights, freedoms and norms can be fully realized.

No State, corporation, human group or individual should engage in any activity that undermines these rights, freedoms and norms. Nothing in this Declaration shall prevent a State from enacting stricter provisions for the protection of the rights of nonhuman artificial life entities.

Based on the Agreement: *Declaration of Rights for Cetaceans: Whales and Dolphins*, 22nd May 2010, Helsinki, Finland. [53]

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LOCATING THE ARTIST: A DIY-WANIA

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ABSTRACT

The concept of 'location' is a central concern to socially-engaged practitioners. Breaking from a focus specifically on the physical and social geography of participatory projects, artists and researchers Alexia Mellor and Anthony Schrag suggest the need to examine 'locating the artist' in regards to cultural policy-making, the institution and ultimately as facilitator of dialogue and change within the physical and online communities in which they work. Our research takes as a starting point the Artist Placement Group and their pioneering projects of the 1960s and 1970s that located artists directly into governmental institutions and businesses and looks at the social, digital and political contexts of socially-engaged practices today: How are artists working within these settings? What do these institutions demand in return? How does locating creative thinking from within structures create space for transformation to a general public? And, in a digital age, how can artists explore the tensions between the specific and the global locale? Included in this scholarly paper is an analysis of the authors' public, participatory and context-led intervention specifically developed for ISEA2014 that explores these ideas further.

INTRODUCTION

Perhaps seemingly unrelated on the surface, critically Socially Engaged and New Media practices are closely linked through a shared lineage of artistic practices that challenge the ways that art is made and how and where it is experienced. This paper explores parallels in both practices as they relate to important shifts regarding how practices respond to and reflect current changing institutional frameworks – technologically, economically and politically. Both practices share ideologies of direct participation, D.I.Y. methodology and the ability to permeate interdisciplinary boundaries. We argue that Socially Engaged and New Media practices' ability to work within and across traditional boundaries is their strength and it is this that facilitates an important platform to discuss critical questions around the role and location of the artist in contemporary society.

Linking historical, social and political functions of Socially Engaged practices to contemporary New Media contexts we look at how both forms of practice challenge the notion of the autonomy of art, traditions of authorship and the authority of the institution. This highlights the complex relationship these two practices have with institutions that fund, exhibit and support them and asks critical questions about the location of the artist within a variety of institutional structures. We will explore these questions via an analysis of contemporary artists' workings, as well as our own practices, including our contribution to ISEA's Site Responsive & Specific/Unique Session: *DIY-wania*. *DIY-wania*, which derives from the 'Dewaniya,' originally a Kuwaiti place of gathering and discussion with roots in Bedouin culture, takes the form of a portable tent structure that is placed into public spaces of Dubai

and activated by participation. The intention is to create an open and informal space where notions of the location of the artist can be presented and discussed by both art professionals and others. *DIY-wania* serves as a working model of alternative forms of social collaboration, aimed to engage ISEA participants and the Dubai community in conversation around the challenges and potentials of Socially Engaged and New Media practices.

CONTEXT OF SOCIALLY ENGAGED AND NEW MEDIA ART PRACTICES

While both Socially Engaged and New Media practices fundamentally challenge traditional notions of artist/audience relationships, are process-focused rather than object-based and present difficulties to traditional art institutions when it comes to how the work is not only presented but also evaluated, perhaps the most important similarity for our purposes is their demand for a shift from simply understanding the aesthetics of an artwork to understanding what the artwork does. In considering the potential of what the artwork can do, we must also look at where the artwork and the artist, reside: physically, culturally and politically. At the core of Socially Engaged and New Media practices is a desire to reposition the artist and the work, pushing the boundaries of traditional systems. Working with existing communities and creating temporary ones on and offline, these artists question the autonomy of art and the very authority of the institutions that determine how and which art is experienced. It is no longer necessary to cross the threshold of the marble staircase, but rather one can directly participate in the making and content of the work in one's own backyard. We are experiencing an amazing cultural shift in which DIY practices, including user-generated web content, citizen science movements and even craftivism practices are decentralizing power and ultimately changing the look and structure of institutions. One could argue that despite the ongoing omnipresence of corporate monoliths, DIY and digital culture have contributed to the rise of individuals as the new form of institution. Companies are no longer run solely in boardrooms, but also from kitchens, coffee shops and hot desks across the world. Socially Engaged and New Media practices understand and build upon this way of working and thinking, creating opportunities for individuals to not just interact with, but co-create the content of work which has the potential to mirror, challenge and rethink the socio-political systems at play.

Arguably, the evolutionary parthenogenesis that spawned the two practices lies in the Italian Futurist Movement of the 1910s with its obsession for technology and for reformatting its relationship with a passive theatre-going audience. Seeking a new relationship with art viewers Marinetti and his ilk developed participatory events that included such things as selling the same ticket to 10 different people or leaving glue on the seats in order to enrage

audiences or intentionally insulting people.[1] While none of it sounds very nice, it was their very intention to shake the audience to respond in collaborative and active ways, using new technologies such as Luigi Russolo's *'Intonarumori'* instruments. These were hand-cranked, noise-generating, large-scale boxes with megaphones attached that played various *'noises'* in a precise (technological) musical composition, conceivably being the first *'synthetic-music'* orchestra. This single presentation caused outrage and screaming matches between the players and the audiences, much to the delight of the Futurists who were, as mentioned, seeking a new and active relationship between performer and receiver.

Compare this to current Hacker Art/Hackivism and the shared lineages and the shared belief in the role of the artist as someone who reformats relationships to governing institutional structures become apparent. While further connections between the practices can be traced via the Dada and Fluxus movements, the Happenings of Kaprow and Lebel, as well as Performance Art, perhaps the most useful group to discuss in regards to relocating the artist is the Artist Placement Group. The Artist Placement Group (APG) was initiated by artists John Latham and Barbara Steveni in the 1960s and aimed to explore the place of the artist within non-art institutions. The cultural landscape of the UK at the time – indeed much of the Western World – saw most artists operating within the closed system of the gallery/museum complex, producing and exhibiting work within the confines of the studio and White Cube. APG was quite a revolutionary experiment. It aimed to work in opposition to the normalized model of an institution commissioning an artist to produce goods for consumption within an art setting and rather *"operated on the inverse principle of pushing the artist out into society,"* in the form of *'artists-in-residence.'* [2] By placing an artist as an *'Incidental Person'* i.e., someone independently observing and working within industrial and government institutional contexts including British Steel, British Airways, The National Coal Board and Hille Furniture Company, APG investigated the potential of process-focused, long-term impact on both the institution and the artist's practice. [3]

Many of the APG projects were experimenting with the place of the artist not as a maker of elite objects, but at the heart of industry and government; that the purpose of their placement directly within the industrial institution was not to provide rarefied cultural objects, but as Bishop suggests: *"art [had] a useful contribution to make to the world and that artists can serve society – not by making works of art, but through their verbal interactions in the context of institutions and organizations."* [4] This challenged the very foundations of the object-based art world.

APG was part of the revolutionary context of the 1960s in which artists sought to have direct impact and closer relationships with wider public, giving rise to the Community Arts projects of the 70's and 80's, as well as the subsequent Relational Aesthetics/Socially

Engaged of the 90s and current Participatory Practices. Similarly, artists like Nam June Paik explored the potential of repositioning *'new media'* of television and video in ways that gave rise to our current New Media practices. As Beryl Graham and Sarah Cook state in their book, *Rethinking Curating: Art after New Media*; *"[...] new media technologies are used for commerce, education, social communication as well as for art and the distinctions between the uses of media in these fields is often blurred."* [5] June Paik explored and exploited this intertwining of the television medium and its use in various commercial and non-commercial fields with his work, including *Good Morning, Mr Orwell* which was presented on New Year's Day 1984 as an international satellite installation that placed broadcast into the hands of artists. With direct access and interaction with participants/audiences, the autonomy of the institutions that control the airwaves was challenged. The work blurred the lines of that media's existence as a commercial object and appropriated is as artistic *'object.'* This is not dissimilar to APG who took art out of the gallery and into the workplace. Whereas June Paik took the medium of television out of the hands of the corporate few and into the eyes and hands of the many, APG inserted artists and art processes directly into corporate and government entities. In both the case of New Media practitioners and Socially Engaged practices like APG, the artist's position as *'Incidental Person'* creates a unique vantage point both within and outside the institutional framework.

SHARED METHODOLOGIES

In regards to interrogating the artist's current relationship to institutions, we argue that New Media and Social Engaged works share three major processes that posit these practices at the heart of re-visioning the role of the artist: fostering direct participation, embracing DIY methodologies and possessing the ability to permeate interdisciplinary boundaries.

Direct Participation:

By inviting direct interaction from participants, both in the final *'work'* and often in the working process, Socially Engaged and New Media practices attempt to decentralize, redefine and challenge the traditional systems at play – technological, social and political. In doing so, they examine and open these systems up to critique and potential re-visioning. Our value systems are brought under scrutiny, our understanding of the relationship between artwork and audience is challenged and a focus on co-creation is brought into the critical light.



Fig. 1. *Five-A-Side-Tug-of-War*, 2011, Anthony Schrag, socially engaged work © Anthony Schrag.

In 2010, Anthony Schrag was invited to develop a public/participatory artwork with Hackney City Council, (London) responding to different immigrant groups in the area – Turkish, South Asian, Eastern European, Afro-Caribbean, as well as an ‘indigenous’ Caucasian group. I met with representatives of Hackney Council and Shoreditch Trust to discuss the scope of the work. While the brief did not directly call for anything specific, during the meeting the phrase “*make everyone get along with each other*” was uttered several times.

Schrag was interested to explore how ‘making everyone get along with each other’ was an impossibility within a pluralistic democracy and to have the intention ‘make everyone get along’ seemed to stem from a policy that denied the multifarious cultural identities of the locale. Schrag therefore developed a project in which the differing and opposing ethnic groups from the area came to ‘fight it out’ via the tug-of-war mechanism, aiming to *reveal* and highlight the diversities, rather than eradicate them. The form of this work was a *Five-sided Tug-of-War* and due to the physics of the competition, there could be no ‘winner’ but there could a ‘loser.’ The game became about navigating/forming alliances and breaking/forming relationships to defeat a stronger opponent. In this sense, the game acted to reveal the wider social interactions that were occurring, both giving form and spectacle to the pre-existing tensions. The choices of which tensions should be addressed and which should be strengthened were literally placed into the hands of the citizens. The work aimed to involve participants in a questioning a top-down cultural policy and to give a form to critique governmental systems that engineered a society for specific ends.



Fig. 2. *Lokönenie*, 2010-2012, WRMC Collaborative, multi-media socially engaged work © Andrew Y. Ames and Alexia Mellor.

WRMC Collaborative – Lokönenie

Whereas Schrag's piece gives evidence of a Socially Engaged practice facilitating direct participation from a site-specific community, WRMC Collaborative's (Alexia Mellor and Andrew Y. Ames) *Lokönenie* experiments with participation linked only by a virtual site. Using new media technologies and drawing upon art movements such as the Situationists and Fluxus, WRMC Collaborative created *Lokönenie*. Meaning 'place nowhere' in Esperanto, Lokönenie is a multi-platform project that challenges notions of place and belonging by creating a portable country on and offline, whose only fixed location is its URL. Integrating aspects of corporation and government with open source principles, this project suggests the possibility of creating a culture and place of one's choosing. With installation art, performance art and digital art components, WRMC Collaborative builds a nation whose citizens are active online and off.

Lokönenie aims to offer an alternative to the encroachment of corporate entities into public space by creating a 'citizen-led' nation-state that takes the dominant governing principles of corporate culture and subverts them to create a parallel culture; a physical and virtual subculture. Through interventions in public space created with the physical component of the project: 10' x 10' tarps that can be made with templates modified and downloaded from the project's website, WRMC Collaborative places both the project's artists and the project's participants at the center of activating the project and deciding how it interacts with and responds to space. Citizens are 'shareholders,' responsible to and for the conditions of the nation and those belonging to it. Citizens of *Lokönenie* moderate all aspects of the nation: from how and what is governed, to establishing a framework for political freedoms and 'civic duties.' *Lokönenie* provides citizens with a space to govern and act as they see fit, provided they follow WRMC Collaborative's one rule: changes must be for the benefit all citizens. What is deemed 'best' is up for interpretation by the project's participants.

DIY METHODOLOGY:

The widespread trend of DIY that is assisted by digital technologies is powerful and here to stay. The DIY ethos of decentralizing power is core to both New Media and Socially Engaged practices. Because practices seek a methodology that is not based on formal systems, but rather responsive to the context, using available materials and resources, they reflect contemporary models of making and promote the redistribution of resources and power. Could these practitioners be seen as our modern day tricksters?

Craftivism

'Craftivism', is a term coined by Betsy Greer that combines 'craft' and 'activism' to highlight the potential of craft practices as a political voice. Perhaps more than fine art practices, craft has been seen as belonging to everyone; a creative expression rooted in the everyday. As such, it is often perceived as being more

accessible than fine art practices that are relegated to the ivory towers of art and academic institutions. Craftivism might entail a 'yarn bombing' of public space or anti-war cross-stitched tapestries. It might be a subtle gesture or covering a military tank in crocheted squares. Ultimately, craftivism is a tool for artists and non-artists alike to spark opportunities for dialogue, change the way we view public space and our relationship to governing bodies. Similarly, Socially Engaged practices aim to bring opportunities for dialogue and the re-visioning of governing ideologies into question by relocating the art into the public sphere. That is not to say that Socially Engaged practices are more democratic, but rather that their aim is to challenge *where* the vital conversations and critique occur. By facilitating these conversations and encouraging direct participation, both craftivist and Socially Engaged practices call upon the individual to actively explore their own role within governing systems. Craftivism also has a direct relationship to media-based hacker culture, offering the opportunity to creatively reject the mainstream by quite literally taking systems into one's hands and forming one's own replacement.

Hacktivism

The history of Hacktivism can obviously be traced to notions of 'hacking,' and is, at base, the process of breaking into a formal system with the intention of disrupting its normal flow. The intentions of most Hacktivists lies in political or socially-motivated reasons and while there is a diversity of politics, they all share a desire to interrupt pre-existing architectures. In the tangible world, this is analogous to breaking into a building and physically changing the structure, forcing those who use the building or those who own the building or those who require specific things from that building or those who designed the building to see it afresh and to re-assess their relationship to that structure. The same is true with Hacktivism within the digital universe of the Internet.

Importantly within the context of this paper, while the similarities of its intentions (disruption) can be said to link all hacktivists, the shape of those disruptions is not based on a formal code, but is rather responsive, using DIY methodology that draws from different technological, philosophical or ethical frameworks, depending on the individual desires of the hacktivist and the object of their disruption. In other words, they do not follow a formal, institutional path that is based on traditional systems, but rather forge and develop new paths that are more responsive in nature. This is intimately tied to New Media art practices.

ABILITY TO PERMEATE INTERDISCIPLINARY BOUNDARIES:

In a time in which we are experiencing the need to collapse the silos that exist around disciplines, Socially Engaged and New Media practices suggest the potential of reformatting the distribution of artwork (i.e. outside traditional contexts) and pushing against disciplinary boundaries. The work itself might look more like a government institute, a science experiment or even a knitting club, but they offer keen insight and imaginative responses to contemporary local and global issues.

Tania Bruguera - *Immigrant Movement International*

In 2011, Tania Bruguera used an \$85,000 grant from New York's Creative Time to develop *Immigrant Movement International*, a long-term socio-political or Socially Engaged, project based in Corona, Queens, New York between 2010 and 2015. The purpose of this work is described from its mission statement:

IM International is a community space where practical knowledge is merged with creative knowledge through arte útil with a holistic approach to education open to all regardless of legal status.

IM International is a think tank that recognizes (im)migrant's role in the advancement of society at large and envisions a different legal reality for human migration.

IM International is a lab practicing activist tactics and new tools for communication in the public sphere to access political dialogue in an effort to transform social affect into political effectiveness.

IM International is an educational platform formulating sustainability systems and creating alternative economies based on a culture of reciprocity not economic advantage. [6]

More importantly, *IMI* raises questions about who is defined as an immigrant and challenges political systems and cultural dynamics around this issue. For this project Bruguera herself lived for a year with illegal immigrants and set up a space that hosted slogan writing workshops, protest planning, educational projects, developmental opportunities, counselling services, language lessons, legal advice, as well as long term goals for immigrants, including creating sustainable models to expand programs supporting women's health and small businesses.

This project problematizes the notion of art's 'function': Is it activism? Is it political action? Is it a dialogic process? Is it community building? Is it cultural exploration? Most importantly, the project problematizes art's and the artist's 'place' as it does not exist within a single institutional boundary, i.e., 'a gallery' but rather transverse educational, commercial, legal, developmental, medical and social contexts. It repositions itself as something that can move through any and all boundaries to achieve its social and aesthetic goals and the distribution of the 'artworks' exists on multiple levels: one-on-one conversations, documentation of protests, the construction of banners as aesthetic objects, the legal and cultural challenges it takes, to name but a few.

Like Bruguera's *Immigrant Movement International* project, Simon Farid's daring *Being Mark Stone* project looks at contemporary issues of identity and otherness. Farid was interested in the idea of 'identity squatting,' taking over former identities created by police and other government agencies for the purposes of undercover work. What happens to this identity when the undercover assignment finishes? What is the legacy of these

identities, both socially as well as in the form of the digital traces that still linger? Could these now vacated identities actually be 'squatted'? Farid speaks of the work being, *"...about the shell identity Mark Stone himself. Through this, what I have been doing is investigating the limits of identity and the interaction between technology and our understanding of our administrative and social selves. It has also been an investigation into the extent of the police's fabricated identities and a look at the traces these identities leave behind in the systems they operate within."* [7] Farid was aware of and walked the fine line between disciplinary and ethical boundaries in an attempt to understand just what forges identity in the 21st century. From an email account, to postal addresses, to NHS and passport numbers, Farid uncovered, reactivated and transposed information publicly available about Mark Stone. Subverting existing systems and placing himself as the artist in Stone's administrative shoes and digital footprint, Farid questions the impact of these identifiers on our social identities. Could 'he,' the shell identity that was Mark Stone, actually be reactivated, almost like a modern day Lazarus? What does this mean for the rest of us?



Fig. 3. *Being Mark Stone*, 2011-2014, Simon Farid, participatory and new media
© Simon Farid.

ALEXIA MELLOR AND ANTHONY SCHRAG – DIY-WANIA

In an effort to explore the merging of aspects from Socially Engaged and New Media practices and therefore the potential to challenge how we locate artists, we have developed *DIY-wania*. This project exists as a synthesis of all three processes previously mentioned as critical to both Socially Engaged and New Media art practices. Our aim is to create an alternative space to the closed academic structures in which many conferences take place by directly involving participants – ISEA delegates and members of the public; art and non-art professionals – in dialogue by demonstrating a DIY methodology that could be applied to creating new social spaces transgressing disciplinary and place-bound boundaries. *DIY-wania* temporarily claims space and creates an open platform for participants to engage on their own terms.

During the iteration of this project in Dubai, two-way participation is created between The NewBridge Project project space in Newcastle upon Tyne (UK) using everyday technologies. The resultant interactions are archived on the project website,

broadening the discussion and potential for participation, making use of the space and outreach that the digital affords. By relocating the dialogue, both on and offline, this project aims to create a space for new concepts to emerge, illuminating local and global issues.



Fig. 4. *DIY-wania*, 2014, Alexia Mellor and Anthony Schrag, socially engaged artwork
© Alexia Mellor and Anthony Schrag.



Fig. 5. *DIY-wania*, 2014, Alexia Mellor and Anthony Schrag, socially engaged artwork
© Alexia Mellor and Anthony Schrag.

CONCLUSION

The art most recently known as 'new media' changes our understanding of the behaviors of contemporary art precisely because of its participation in the creation of a cultural understanding of computational interactivity and networked participation. In other words, art is different after new media because of new media, not because new media is 'next,' but because its behaviors are the behaviors of our technological times. [8] In today's context, the digital realm of the Internet and public spaces exemplify territories that both government and corporations are vying to control. Public space and the Internet are to contemporary Socially Engaged and New Media practitioners, what heavy industry and bureaucratic agencies were to APG artists of the 1960s and 70s. Ours is the legacy

of twin histories that relocate the artist to the heart of new technological, social and political constellations with the aim to offer opportunities to critically reflect and mirror both the problems and potentials of these institutions. We exist in the center in order to look outwards, that is our political, technological and social imperative. Could we utilize our unique position to relocate ourselves not only in and around institutions linked to our practices, but in terms of challenging policy? Could the artist potentially become the ultimate consultant, drawing upon our unique experiences?

The potential of this reformatting of the location of the artist is currently challenged by the institutions which aim to recuperate these transgressions to their own ends, presenting process-based and politicized works as commercial and aesthetic objects. [9] There is an additional problematic situation, especially within the UK, where Local Governments and other publicly-funded institution now implement artist-in-residence projects in order to instrumentalize the artistic process towards hegemonic ends. This highlights a dilemma that many artists, particularly with process orientated practices, face. Where needed, paid opportunities are provided and directed by the very institutions against whose walls the artists are rattling. The challenge we then face is not to be co-opted into the institution, but rather to resist the ways in which institutions try to place and locate artists and find – or create – new locations of our own.

ENDNOTES

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2. Bishop, Claire. *Artificial Hells: Participatory Art and the Politics of Spectatorship*. (London, Verso. 2012), 166.
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9. "Then when they realize that there is no transgression that cannot be recuperated, they also conclude that art can no longer play a critical political role" (Mouffe, C. *Art and Democracy: art as an agonistic intervention in public space*. (Rotterdam, NAi Publishers. 2008)), 107.

THE LOCUS OF ACTION – TINTED WINDOWS

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ABSTRACT

This paper is about the ways artists and to a degree scientists deal with (and endure) new meaning and comprehend and construct the world. The research reflects on the intense connection between comprehension and construction and their place of creation – the 'locus of action.' It seeks to define a malleable form of understanding and analysis capable of approaching our complex liquid world as discussed by Zygmunt Bauman. The aim is to establish a multi-viewpoint theoretical approach based on the dynamic concept of the Flâneur as introduced by Baudelaire, replacing single viewpoint categorization. This is coupled with the concept of thickening as proposed by Clifford Geertz with its implication of interaction between multi-layers of meaning. Here walking and looking is introduced as a method or strategy, a model or map, providing a framework of understanding in conditions of hybridity and change.

In *The Barbarians*, Alessandro Baricco describes the decline of our old notion of culture. [1] Is there in our present time of internet, digitalization, globalization and migration still a place for profundity, contemplation and order or is the world dilapidated in a society of consumption and opportunism? According to Baricco this discrepancy might not exist, our modern culture has become liquid and is in a state of mutation and alteration. Today, this can be illustrated by the current discourse around the complex relation between art, technology and science or between artistic research and art production.

Today art production and the context and location of its creation and evaluation are in a constant debate, academic research as opposed to artistic mastery seems to be the new paradigm. This paper explores the place of action, the new third space, the 'laboratory' in its most experimental form, where art is realized next to the trusted atelier or the public space. In this project we explore the apparent newness of bringing research into the art context while simultaneously asking what it means to practice art and where that action takes place. As a result the research speaks to present concerns about the arts as much as to the field of academic research. What has changed exactly and how and when has this influenced our perspective of art and art production and consequently our being in this globalized, digitized world? In short, what has become culture today?

In his book *Liquid Times*, sociologist Zygmunt Bauman remarks that our society recently has moved from a *solid* phase into a *liquid* phase, referring to the fact that our social forms (structures, institutions, [...]) are no longer able (or in a situation) to 'keep their shape for long, because they decompose and melt faster than the time it takes to cast them and once they are cast for them to set.' [2] In other words society in itself and with it all possible

models or frameworks for interpretation have become *liquid*, in a constant state of change in a constant middle or in-between-ness.

In the classical (Western) interpretation of logics an articulation however can only be false or true, dismissing this middle (or ever-changing stage) beforehand. In other words, interpretation and understanding become an all or nothing evaluation leaving little ground for interpretation. Seen in this way it denies any possible re-positioning or a 'transversal movement' as avidly proclaimed by Deleuze and in doing so installs a static system of interpretation. For Deleuze: 'The middle is by no means an average; on the contrary, it is where things pick up speed. Between things does not designate a localizable relation going from one thing to the other and back again, but a perpendicular direction, a transversal movement that sweeps one and the other away, a stream without beginning or end that undermines its banks and picks up speed in the middle.' [3]

In an article entitled *The Flaw of the Excluded Middle* Paul G. Hiebert investigates why the Western worldview (in a theological sense) excluded this middle level. According to him, our belief in this middle area vanished during the 17th and 18th centuries as a result of the Platonic dualism and a science based on materialistic naturalism: 'The result was the secularization of science and the mystification of religion. Science dealt with the empirical world using mechanistic analogies, leaving religion to handle other-worldly matters, often in terms of organic analogies. Science was based on the certitudes of sense experience, experimentation and proof. Religion was left with faith in visions, dreams and inner feelings. Science sought order in natural laws.' [4] Today, this notion seems to be in flux. Religion and science are on the move. Systems do not have the time to settle down and become established and therefore can no longer serve as frames of reference or long-term strategies. Adversely, although many of these views on the importance of a liquid and ever-evolving world space are verified by studies in art, architecture, geography and science, these studies appear not always to reveal the complete picture. On closer examination the *fluid* or *liquid* inherent in these studies seems to vanish. Stefano Boeri sharply remarks: 'These are disciplines that should keep their finger on the pulse of living conditions in the urban context, but that often seem more interested in studying the flux and flow, rather than the locally felt friction that influences them.' [5] In doing so, our awareness of this *global fluid* model of our world paradoxically has increased the specificity of the *local* and the *solid*.

We could argue that also Zygmunt Bauman is thinking in the same direction, for him *society* is increasingly becoming a network rather than a structure, meaning people perceive and

treat it as a set of random actions (connections and disconnections) and as an infinite volume of 'possible permutations' making long-term planning, predictions, models and actions collapse. As a result we move into a series of short finite projects which in a way can also form a new system of infinite series of finite sets but where it becomes impossible to apply enduring concepts such as development, maturation or progress. He concludes: 'A life so fragmented stimulates *lateral* rather than *vertical* orientations. Each next step needs to be a response to a different set of opportunities and a different distribution of odds and so it calls for a different set of skills and a different arrangement of assets.' [2] In other words, the risks of such a system is that in order to make the entire system work one will need to transcend the comprehension of the individual, local or finite projects. One of the lessons to be drawn from these contradictory forces is that the greater the exchange, the more aware we become of the subtle and sometimes deep differences. This type of *undertow* of thoughts and associations constitutes the building blocks for this paper. In drawing and mixing up maps, models and theories, this study will re-introduce the *flâneur* by Baudelaire as a methodology to unravel and disclose these (on first sight) paradoxical undertows and as an alternative framework of interpretation taking into account at once the local and the global, the solid and the liquid. This, it is argued, will be done by walking and *looking through* as many windows as possible. [6]

The concept of the *flâneur* is re-appropriated for its capacity to connect with the different formulations of change or liquidity, to indicate a common ground or effect of moving, as an area for creation or discovery of the new. In other words, as a creative potential or concept on a par with the Deleuzian *middle* or the concept of the *in-between-ness* from Homi Bhabha amongst others. Realizing that this research is by definition incomplete and to a certain extent ambiguous, it is our optimism and prospect that the defined goal remains evident and legible: that is about the ways artists and scientists deal with and endure new meaning, how they comprehend and construct this *liquid* world and where this locus of action is situated. In this respect this paper is not an experimental science trying to identify and construct a strict (or rigid) set of laws but rather an approach to interpretation in exploring and checking out explanation, significance and meaning. In this context a second concept is installed, *thickening*. Just as in cooking a thickener is used to thicken (or increase the viscosity) of fluids, the concept of *thickening* as described by Clifford Geertz will be used in an attempt to thicken our liquid knowledge society as discussed by Bauman. This act of *thickening* can be reformulated in the context of accumulating, becoming more intense or intensifying, deepening – a process made possible by the *flâneur*, who dwells the streets, visits, re-visits, looks, observes and looks again.

In his landmark book *The Interpretation of Cultures*, the anthropologist Clifford Geertz elaborates on this concept of *thick description*. For Geertz what a researcher is faced with (except

the automated routine of data collection) 'is a multiplicity of complex conceptual structures, many of them superimposed upon or knotted into one another, which are at once strange, irregular and inexplicit and which he must contrive somehow first to grasp and then to render.' [7] In other words, Geertz is well aware that meaning is always changing, always in flux and rooted in a specific culture, therefore he suggests the thick description as a means to describe the phenomena together with their context through a multilayered approach. In order to access these (multiple) local realities embedded in and part of a (possible) larger or global worldview, the stroller or wanderer or *flâneur* is crucial as a device to unravel and present evidence for understanding the increasingly complex ways in which artists and scientists (people) develop, model and mirror our world.

In literature and philosophy many authors have addressed the character of the wanderer or walker as a tool (theoretical construct) for articulating local realities. The idea of the *flâneur* was inspired for Baudrillard by Edgar Allan Poe's *The Man of the Crowd*, where a nameless man (the narrator) follows another person through London. The *flâneur* feels at home in the city and dwells the streets (anonymously) to look at and register local habits and facts within a multilayered, global entity. A good example for this shift from global or general observations to detailed descriptions can be found in Poe's work: "At first my observations took an abstract and generalizing turn. [...] Soon, however, I descended to details and regarded with minute interest the innumerable varieties of Fig, dress, air, gait, visage and expression of countenance." [8] Bit by bit, the *flâneur* is able to analyze, categorize and define the different entities that he is overlooking in an attempt to construct the whole, the initially unreadable: *It was well said of a certain German book that 'es lässt sich nicht lesen' it does not permit itself to be read.* There are some secrets which do not permit themselves to be told.' Both the characters of Baudelaire and Poe feel comfortable in a fluid, liquid surrounding and their trajectory is mainly guided by the interest in seeing, discovering new things, a search for novelty in an active way by walking. As such, the walking becomes an allegory for the intellectual endeavor or processes during the search and looking, observing becomes their prime and most important activity. For James V. Werner this active process differentiates the walker from the observer and creates a fluid and observational viewpoint rather than a static one, that *allows (indeed compels) him almost completely to 'read' his environment, nearly to transcend the boundary between interpretation and experience [...]* [9] Also for Burton, the *flâneur* 'strives to be both all-seeing and invisible' and unlike the observer he will do this in an active manner. Or, in a Deleuzian sense a nomadic travel generating a series of 'close-range' visions in a multiple, variegated environment. [10] One can choose to walk intuitively or one can choose to walk following a fixed route. However, one element proper to the *flâneur* proves to be relevant to the construction of meaning, it involves a viewing position. Are we in or outside a given system, do we take part or simply observe, do we look from within or above?

For the physicist Heisenberg: "*When we speak of a picture of nature provided by contemporary exact science, we do not actually mean any longer a picture of nature, but rather a picture of our relation to nature [...] Science no longer is in the position of observer of nature, but rather recognizes itself as part of the interplay between man and nature. The scientific method of separating, explaining and arranging becomes conscious of its limits, set by the fact that the employment of this procedure changes and transforms its object; the procedure can no longer keep its distance from the object.*" [11] For the physicist Barbour: "*It (the model, sic) is an imaginative tool for ordering experience, rather than a description of the world.*" [12] Meaning, therefore, we can argue is not homogeneous but heterogeneous, in shifting perspective, in changing our points of view we recognize the complexities surrounding concepts in our liquid world. For the philosopher Tariq Ramadan meaning is embedded in our pluralism society: "*[...] we all observe the world through our own windows. A window is a viewpoint over a horizon, a framework, a piece of glass that is always tinted to some extent and it has its orientation and its limitations: all this together, imparts its colour and qualities to the surrounding landscape.*" [13] Therefore, if we want to consider the diversity (and the possible similarities) we have to walk like the *flâneur* and look through as many possible different windows. Enhanced meaning can only be discovered through these multiple points of view, each one limited, each one relative, but in combination revealing a more complete picture.

It is through these mechanisms of change and shifting viewing positions that walking and looking finds its final purpose and meaning. The *flâneur* in this context could be defined as a framework of understanding which extracts its functioning in the shifting of perspectives or better in its ability to shift perspective. In the acknowledgement of the existence of different sets of meaning (both historically as existing in different disciplines or knowledge domains). By taking into consideration other viewing positions and by transferring concepts into another, the *flâneur* acts as a bridge, revealing relationships between the different models or maps which can not be assessed from within those systems themselves.

Furthermore, it has become apparent that this notion of *thickening* through looking, defined as a hybrid position, plays an important role in the generation of novelty, that is, to generate new insights and meanings. It is this hybrid position, shifting between two or more viewing positions, between two and more windows, that should allow us to reveal a more complete picture. By rapidly moving from one window to another the boundaries between the two become blurred, they become permeable, transferring characteristics from one point of view into the other and vice versa. This feature of shifting perspective is one characteristic of *looking* and enables us to enhance meaning by transferring concepts and ideas from one system to another and additionally allows us to discover new connections and relations between them. The *flâneur*

displays the importance of this hybrid positioning, which is the added value of shifting perspective by reconfiguring, transferring into another historical context or repositioning concepts.

A second new feature refers to the location of action (or generation/ construction of novelty) itself. We have seen that this shifting position allows us to retrieve meaning not only within the different systems but also between these systems. In other words, a result of the change of perspective is that not only new relations are becoming visible, relations that from within the system are invisible (not perceived) but also that the location of this information is situated in-between the installed systems of knowledge (maps, models or theories). They become locations of meaning and action on their own or we can say, on their own terms they become new *liquid* systems. This we could argue is a result of what Zygmunt Bauman has called the liquid modern world. [2], [14] Social forms and systems are no longer able to settle down and become established. As a result overall structure makes way for an infinite network of short, small projects and structures that continuously tend to permutate each other. In order to understand the entire system we need to understand the series of infinite smaller structures and their in-betweens.

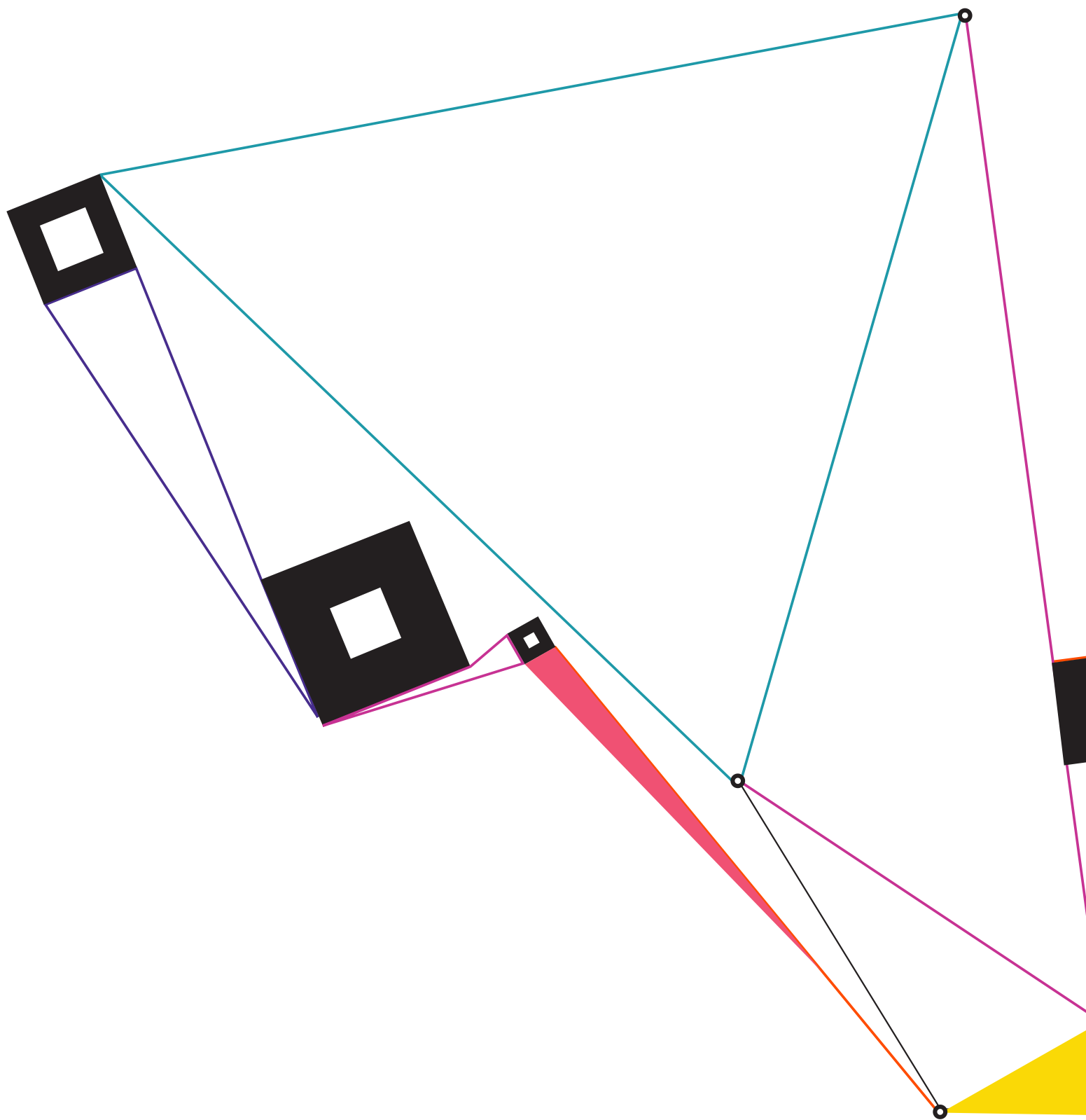
For Homi Bhabha in his book *The Location of Culture*, it is at the boundaries of cultures, at their interfaces that meanings and values are (mis)read. However, he notices that this interface or limit is seldom addressed and often even disavowed. By walking and looking not only are new locations discovered, but also locations that exist between installed systems of knowledge and that have become visible through a change of perspective. Here we can argue that these new discovered spaces are a space for negotiation. This space is a place that allows for the re-location and re-configuring of concepts that as a result of this process of shifting perspective no longer belong to any one system and it is also a place for the new insights and concepts that were made visible or that were generated in-between locations. This location of action, as made visible by the *flâneur* space bears some similarities with the sociological and anthropological concept of the *Third Space* as expressed by Homi Bhabha and which refers to a place of negotiation where cultural differences, as expressed through (mis) reading meanings and (mis)appropriations, can be negotiated. Accordingly, this new space or *Third Space* is "*the cutting edge of translation and negotiation, the in-between space - that carries the burden of the meaning of culture.*" [15] With the re-introduction of the *flâneur* we could argue that this partiality of *truth* is to be found in the unstable nature of the generated content itself. The liquid nature of the systems and the shifting perspective by default install a limited and therefore unstable novelty. Each concept, through the shifting position, must be evaluated from the standpoint of all the systems, as these in-between places are in constant flux. Thus reassessing information from different points of view by definition makes its lifespan short or temporary. The in-between space is a temporary space, a space in constant flux subsequently altering the content of the assessed concept.

This dilemma of constructing the concept of the *flâneur* over a liquid, decentered and multi-faceted object has been with the research from the outset. Nevertheless, by re-combining, re-evaluating and questioning existing concepts additional layers of meaning or an enhanced meaning can be generated, the process of *thickening*. This is possibly reflected by Bauman by saying: “*The best among the contemporary arts are ultimately so many steps in an unending process of reinterpreting shared experience and offer standing invitations to a dialogue - or, for that matter, a perpetually widening polylogue.*” [14] We might therefore conclude that the only thing that thickens or becomes more solid in this liquid world, is the interaction, an active encounter between people and ideas.

What needs (needed) to be mapped then is this space of negotiation, the real locus of action, a space signifying the concepts and ideas that are inherent to these in-betweens. Experience, walking, taking the journey and looking through as many different windows is the route we propose. A route that revisits ideas and concepts in different contexts and different locations. For the ancient Greek philosopher Heraclitus we can not step twice in the same river, things have been repeated or look similar, but are never the same.

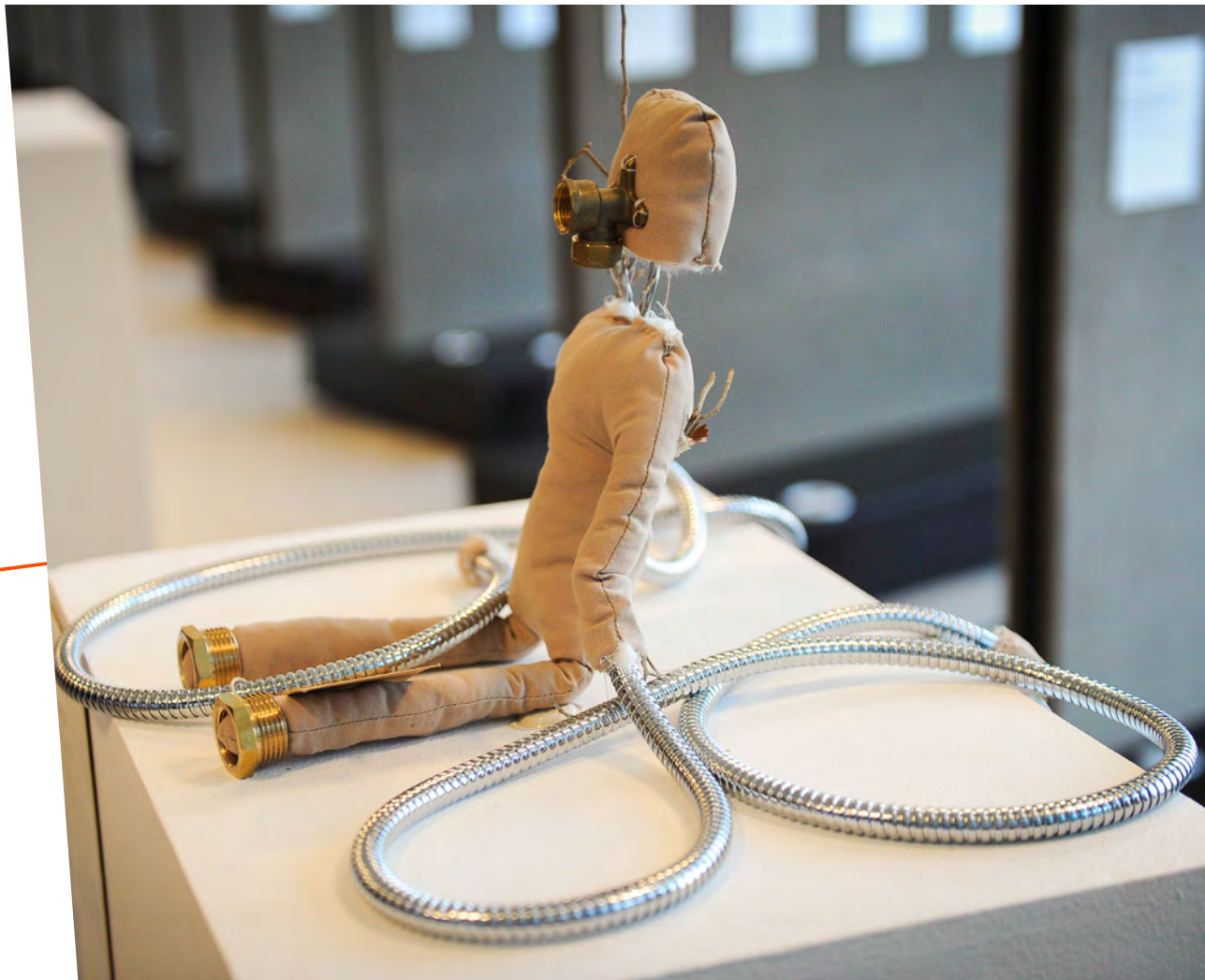
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STREAM 4

SENSORY BODY



APPLYING DATA VISUALIZATION TO CULTURAL STUDY OF THE SALSA

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ABSTRACT

This research explores how data visualization can be a useful tool in the qualitative sociological research methods typically applied to studying cultural practices that involve gestures and meaningful body movement. This investigation targets salsa dance and the salsa dance community. The investigation will produce a research tool that will aid cultural anthropologists and other culture researchers interested in movement in their examinations of the complexity of the dance community surrounding the salsa. The tool will help these researchers gain better insight into the way dancers improvise new styles of a dance and the way those styles are adopted from one dancer to another. By visualizing motion data collected from salsa dancers, the investigation attempts to create a new way to study the cultural significance of gestures and movements. This technique provides a supplemental method of data collection and analysis to the traditional participant-observer method in cultural study.

THE PROMPTING FOR TECHNOLOGY IN ANTHROPOLOGICAL RESEARCH

What is data? Asking this question provides an effective way to explore how data visualization, sociological research methods and dance can come together. Merriam-Webster defines data as “facts or information used usually to calculate, analyze or plan something.” Fact is in turn defined as “something that truly exists or happens” and information as “knowledge that you get about someone or something: facts or details about a subject.” What these definitions provide is room for multiple ways of having knowledge about something that exists or happens. Methods of data collection vary between academic disciplines based on the phenomena they are trying to record. The physical sciences collect quantitative data taken from direct measurements of phenomena, such as the length of time a chemical reaction takes to complete or the amount of substance it produces. Anthropologists and cultural studies researchers collect quantitative as well as qualitative data. While the techniques and subjects vary, the aim to understand what is actually happening is common to both. [1]

This endeavor extends to the field of data visualization. Seeing that there is room for different types of data, quantitative and qualitative. There are also techniques in data visualization that aid different types of data as well. Cultural or social anthropology explores the development of societies and cultures. Social network graphs lend themselves well to representing connections between people in an organized manner that, structured insightfully, can reveal even more about the connections beyond their mere existence. The physical sciences, on the other hand, explore relationships between energy, physical objects and motion. Often translated into functions and relative or absolute measurements, there are various ways of using the two-

dimensional plane to compare amounts or rates of change in the physical sciences. Done well, data visualization in the physical sciences can elucidate unexpected cause-effect relationships. That there are different types of data and different methods of representing each addresses the first half of the definition of data, that it is knowledge of an occurrence or existence. The second half of the definition explains the purpose of collecting data at all – to calculate, analyze or plan. Collecting data usually has a purpose beyond just collecting data. Collections of data are usually used to understand or draw conclusions about something beyond the data itself. Making a truthful connection between data and that “something beyond” sparks debate within the data visualization field about the best way to achieve it.

Practitioners and theorists in the field of data visualization disagree among themselves about what data visualization can and cannot communicate. Stefanie Posavec in her Eyeo 2013 talk discusses the spectrum within the data visualization community that ranges from objective and subjective representations of data, from the accurate and proper representation of statistics to the communication of the overall meaning and relevance of dataset. Posavec describes herself as a freelance graphic designer who specializes in data-related design. She describes the field of data visualization as having two camps: the first camp gathers data purists who require every decision within a data visualization to have a data-centric purpose and the second camp gathers those who allow subjective and emotional motivations in their design decisions. Posavec claims that in reality there is a large gray area between these groups and proposes a new practice, data illustration, to accompany data visualization and information design. She defines a data illustrator as follows.

“A data illustrator is someone who visualizes data in order to communicate something beyond what is evident in the data itself. The message the designer wants to communicate is usually more emotional and subjective than what’s found in the data and often this data’s secondary and used as an objective means to a subjective ends.” [2]

In her data illustration work, Posavec herself has created a dance-related visualization. During her data artist residency with Facebook, Posavec used the data of a couple’s interactions with each other over the course of a month and turned them into dance steps. The work references how couples perform a version of their relationship on social media that is designed for public consumption. The dance steps are imprinted in a hallway of Facebook’s campus and reminiscent of illustrations in printed dance instruction books. This project exemplifies what Posavec means when she says data illustration communicates something that is not evident in the data itself. While the couple’s quantitative

Facebook data could itself reveal a great deal about them, the salient aspects of relationships, how the people in them feel about each other and the overall dynamic of how they relate to each other, may be better represented as a dance than a more traditional graph. [3]

Jer Thorp is a practitioner, whose opinions on authenticity in data visualization contrast with Posavec's. He works as a data artist and has served as a past Data Artist in Residence for the *New York Times*. Thorp creates data visualizations that intersect the subjects of data, science, art and culture. [4] As a data artist, Thorp emphasizes the importance of making data more human instead of making data merely a profitable collection of information for constructing tools and conducting research. To Thorp, the personal stories that contextualize data is what gives it the meaning that makes it important to us. In his February 2014 lecture at the University of Colorado – Boulder, Jer Thorp addressed the topic of authenticity in data visualization. He recommends maintaining the truth in an visualization by discussing the data as a measurement of phenomena but not the phenomena itself. For example, if practitioners create a visualization of census data for the population of a county, the practitioners cannot say that they have represented the number of people living in that country. Rather the practitioner can honestly say that they have represented measurements of the county's population collected by United States government in a certain year using certain methods. This distinction Thorp makes is important because the facts of a data visualization begin in the method of data collection itself. What is the happening that was recorded and how was it recorded? A flaw in the United States census, for example, is that it does not account for the homeless despite their contribution to the population, a relevant fact omitted. [5]

Thorp's and Posavec's viewpoints address two important questions in visualization: what is the truth the visualization should communicate, and what are the limits to communicating that truth as accurately as possible? Both Thorp and Posavec agree that data's relevance is in a realm beyond the data itself. Thorp often cites his personal sentiment for the GPS location of where he met his significant other. The data point's value is based on the experience connected to it. GPS data can track an people's movements but not the deeper story of the motivation and significance of their travels. Data illustration for Posavec gives room for a practitioner to communicate personal viewpoints into the interpretation of a dataset. The limitations on communicating this truth are, as Thorp mentions, part of the nature of dataset and as Posavec notes in her talk, part of the design decision making of the practitioner. The subjective insights of the person creating the data visualization cannot overtake design decisions to the point that the data visualization can longer communicate the topic of the dataset. Anthropologists face the same concerns of balancing straightforward statistics with artful context when interpreting data. Anthropologist Clifford Geertz proposed an interpretative approach to anthropological research that set him

apart from functionalist anthropologists such as Levi Strauss who asserted that cultural elements, such as rituals and institutions, could be understood according to the purpose they served. [1] In his book *The Interpretation of Cultures*, Clifford Geertz breaks down the significance of observing a phenomena but also infer its greater meaning. He provides examples for several different contexts and motivations for a man to rapidly and repeatedly open and close his right eye. The man could have a twitch and thus the motion has no meaning beyond indicating a physical condition. The man could also be signaling a friend in morse code through a series of winks. Or, if there are two men opening and closing their right eyes, it could be that one man is mocking the other. Phenomenally the action looks the same in all three situations but has different causes and intentions. An anthropologist observing this behavior then, according to Geertz, cannot simply recount the action. He must also recount the context and meaning of the action; he must interpret it. [7]

This discussion of what data visualization can honestly communicate is relevant to this project in that it calls into question this type of interpretation proposed by Geertz into question. Motion data collected from a person's movements can provide an objective measurement of how a person's body was positioned over time. However, that would not be the goal of collecting the data in the first place. Contextualizing those movements as having the purpose of dance and then interpreting their meaning or significance would bring purpose to the dataset. The question that stems from this is the method. Should an anthropologist use motion data to understand a gesture and its cultural meaning? Is the data that the anthropologist can effectively use limited to his direct observations and participation in a community and interpretation of those experiences? Any camera or motion tracking device will see the same phenomena as the anthropologist, but they will generate additional information in their observation that the anthropologist cannot and at a level detail the anthropologist cannot. Qualitative data will be generated from observing these physical facts regardless of the technology employed to capture evidence of this motion, so is motion data collection appropriate in anthropological research? Can anthropological research use motion data visualization to support its research? Justifications for why this may be an appropriate method come from complexity theory.

COMMUNICATING THE SALSA

Studying salsa dance and its community with the aid of digital tools continues the mediation the dance has undergone to satisfy the growth in its popularity around the world. This mediation, however, has had its own effects on the spread of the dance and its fans. The following section will discuss the effects of mediation on the spread of salsa's various styles and the social status of its dancers, precedence for motion study using camera technologies and abstraction of motion data recording to properly analyze dance movement. Viewers of the popular television show *Dancing with the Stars* may claim that dances such as the salsa are an art

form and they would be correct in the sense that people who dance the salsa bring their creativity to it. [8] Salsa develops in, what Sheenagh Pietrobruno calls, "lived circumstances" in her book *Salsa and Its Transnational Moves*. [9] While the dance involves an artistic and expressive endeavor on the part of the individual dancers, the dancing the salsa is not in the same category as the performing arts, such as ballet or theatre, nor the fine arts, such as painting or sculpture. Dance as a human activity with cultural significance and meaning has a long history that begins with the cultural practices of primitive societies. This research examines the cultural dynamics of modern social dance, specifically the salsa. The purpose of limiting this investigation's scope to modern social dance is to understand it as a distillation of cultural identity and identity negotiation based on the interactions within a dance community of people who do not necessarily identify their dancing as an artistic practice but more so as a social activity. The investigation also aims to understand the images of the salsa mediated by modern communication technologies. As such, when tracing how this social or "folk," dance and its variations travel across its transnational community of dancers, they can be examined not only in how they flow from dancer to dancer, but also in how they flow through media channels. For the purpose of this investigation, the salsa will be examined because of its rise to international practice demonstrated by its popularity in large, urban cities across the world. [9]

Other cultural practices can provide a framework for understanding how salsa may have risen to international popularity. The process of communicating a social dance like salsa can be considered an oral art in the sense that salsa is not communicated in a written form. However, mediation of the dance has diminished its oral history qualities. Oral histories tend to have features that make it easier to hold them in memory, such as rhythm, patterns and formulaic constructions. Salsa is communicated not so much by words, but by the shared movement of dancers as they cue each other from move to move through body language. On the other hand oral traditions, similar to dance, incorporate improvisation, making each re-telling of a story a unique performance by the orator. As two dancers interact, they trade moves and styling from their respective dance cultures that their partners may accept and incorporate into their own style of dance. However, the commodification of salsa dance into dance lessons and ballroom competitions preserves salsa in a manner that diminishes its ability to continue morphing as it spreads. Mediation of the salsa through dance books, manuals, videos and graphical representations contributes to this as well. Recording salsa into a medium preserves one distinct style of the dance and usually this style is not the salsa danced in lived circumstances as a social, cultural activity. It is usually the ballroom style of salsa that is preserved in media. Preserving this style of salsa serves the economic purposes of ballroom culture. In order for judges to evaluate competitive dancers against each other, the judges need some canon of style on which to base their decisions. The commodification and mass marketing of ballroom salsa then tends

to leave out the more organic style of "street" salsa or the salsa that is not inspired by the performance focus of ballroom dance culture. Salsa as it is danced in lived circumstances will still be preserved. Those who dance it as a performative means of living their cultural identity will maintain the more organic qualities that allow for creating new styles from it. However, its international image will be one adapted to and commodified by Western ballroom culture. [9]

Codification and value associated with certain styles of salsa are important because they express power struggles and social hierarchies embedded in the society surrounding the dance community. In *Salsa Crossings: Dancing Latinidad in Los Angeles*, Cindy Garcia describes the way dance partners may choose to disguise their Latin identities by adapting their dance style to the more performance-oriented, glitzy style whose image has been mass mediated by Hollywood films such as *Dirty Dancing*. Another part of the process of becoming a respected, sought after dance partner in the L.A. salsa scene is to disguise any dance movements associated with "blackness." Despite salsa's Afro-Cuban origins, black dancers and Cuban style salsa dancers, because Cuban-ness is conflated with blackness, are shunned and their dance style is excluded. Ballroom style salsa is positioned at the top of the style hierarchy in Los Angeles because dancers want to disassociate from ethnic identities that are devalued in U.S. society. Dancers recognize the history of discrimination aimed at African Americans in U.S. society, so they exclude dance styles associated with them to avoid the negative perceptions surrounding this group. Street salsa is associated with undocumented, Latino low-wage workers who are stereotyped as all immigrating from Mexico despite coming from all over Central America. These are just the current power struggles that are embedded in salsa. Tracing the dance back to its origin, many countries attempt to take credit for creating the salsa, though it is often attributed to Cuba. However, Pietrobruno observes that no culture has a pure origin. For example, while the salsa is traced to Afro-Cuban origin, the Spanish influences of the dance had African influences embedded in them already before interacting with the dance rhythms of African slaves. Spain's dance culture and music was influenced by the invasion of the Moors of North Africa, so the influence they brought to the dance was already that of hybridized dance culture. [10] Understanding salsa's commodification, communication and origins brings to light how its transmission is controlled. The transmission of salsa is subject not only to the limits and methods of oral communication, media and mass marketing, but also to the identity negotiation of the dancers. This investigation creates a tool that can bring this process to light by creating a visualization of movement in salsa dance. The visualization in this investigation serves as a tool for motion analysis.

VISUALIZATION DEVELOPMENT

The participant observation method is a qualitative data collection method employed within anthropology. In this method, researchers live in a foreign culture while keeping a thorough account of

observations and interviews with their subjects. [11] In participant observation, researchers enter into the life of the community they examine. Data collection tools used in this process may include journal entries and audio and video recordings. Using the Microsoft Kinect for specifically motion data collection and visualization offers the advantage of a relatively inexpensive, commercially available and portable device for capturing motion data. This device has the additional benefit of providing depth sensing of motion without invasive equipment, such as reflective markers often using in more advanced motion capture systems, to collect precise motion data. Using open source software such as NI Mate and programming language libraries such as openFrameworks, developers can create applications that use motion data sensed by the Kinect. The data visualization tool built in this investigation uses the Kinect, NI Mate and openFrameworks. NI Mate is a freely available software application that allows users to read and send messages to the Kinect using the Open Sound Control or OSC, protocol. OpenFrameworks is an open source C++ library for creative coding. Before deciding to use this set up, other methods and arrangements were tested.

In its first iteration the visualization needed to simply read previously collected motion data files. At this point, the code was written in Processing using a BVH file parser and motion data available from the Perfume motion data project. Perfume is a pop band from Japan that released motion capture data of one of its performances for the public to use in creating animations and other motion graphic creations. As a newcomer to working with motion data, the first challenge in the project was understanding how motion data was translated into usable form. The most common file formats discovered were BVH files, a proprietary format from Biovision, a company that has since closed and AMC/ASF files. Carnegie Mellon University offers a large database of over 2,500 motion capture files in the latter format, but they have all been converted to BVH files. With a available sample data, the next step was what coding languages were available for working directly with motion data, not just a lifestream of motion data from a camera. After further research, the Perfume project was discovered, which provided sample motion data and a BVH parser. This was the first success: finding a file format that could be read and manipulated in a familiar programming language.

The next challenge was to understand how to manipulate the 3D motion data to create 3D graphics in Processing. Using Processing in its 3D rendering mode was new, so a great deal of time was spent reading and trying to understand the P3D tutorial. This was complicated by multiple browsers not running the Java examples referenced in the text. The breakthrough came from abandoning this slow method and just twiddling with sample code in Processing itself. The biggest adjustment was understanding how the axes in Processing are set up and the way shapes rotate. Once 3D in Processing finally clicked, development moved on to creating a 3D grid that could be used to measure movement of individual's motion data. Getting this right required working with

the 3D rotations to check that the code rendered as expected. However once this was transported to the sketch running the motion data, things started to fall apart. The grid needed to be rendered at actual size, not scaled and the number of grid lines had to be reduced. Rendering the 200 grid lines at 60/sec along with the motion data slowed Processing down dramatically. The idea was to visualize each individual within a grid. At first, this simply meant translating the grid along with the sample motion data. However the way the parser works, using the parameters directly actually broke up the human form into appendages. The grid inside the sketch worked, but it needed one data point parsed out from each dancer to center itself on. A JAR file reader helped open up the BVH parser class. The BVH file would need to be read to pull out this particular point, not just play the data.

The second iteration created a method of recording the motion data. The system needed to create a file of timestamped motion data and export time-sequenced images of the motion in action. This iteration was successful in that the system created did create a text file of motion data and that the system did create a series of images of the motion captured over time. However the system sometimes created un-readable image files and the visualization itself required further development. In addition to this, the feedback of the motion data into OpenFrameworks did not visually reflect the same actions in real space. The tracked user's movement did not affect the graphics in a straightforward way like when someone sees himself in a mirror or video camera.

Several technologies were tested for this iteration (Processing, SimpleOpenNI, OpenFrameworks, ofxKinect, ofxOpenNI, Synapse and SynapseStreamer) to determine the best method for collecting data from the Kinect. This iteration revealed some of the Kinect's quirks in its motion sensing detection due to its design for home living room use and the types of motion data information it offers. The first recording used MaxMSP, a visual programming language and Synapse. MaxMSP was later substituted for text-based programming. The first test arrangement used Processing and SimpleOpenNI. OpenNI allows developers to create software for natural interface devices and SimpleOpenNI provides a wrapper for this middleware so Processing developers can create interactive projects with it. This method was abandoned after further research into the SimpleOpenNI library. The library's original creator no longer developed for it or provided support for its development community. His example programs were added to the Processing forums with a notice to the community to help each other figure the library out on their own.

Keeping in mind that the final setup will ideally be useful to anyone who intends to repeat this project, it made sense to move on to another solution. The next test used openFrameworks. OpenFrameworks had the advantage of already having an ofxKinect library integrated into its native build. This particular library, however, did not provide skeleton tracking and only allowed manipulation of the depth sensing data. Development

proceeded to another library for the Kinect, `ofxOpenNI`, a wrapper for `OpenFrameworks` offered access to joint data. Extracting the Kinect's joint data from the `ofxOpenNI` library was unclear. Further research uncovered an application that used Synapse with `OpenFrameworks`. The program took advantage of a Synapse class written specifically for `OpenFrameworks`. This setup worked, but the limitations of Synapse would ultimately replace it with `NI Mate`. Using Synapse with `OpenFrameworks` was very similar to using it with `MaxMSP`. The program needed to be running before starting the application to properly collect data. The hinge was understanding how Synapse returns that data and realizing the difference between vector data, `ofVec3f` and the C++ vector data type. Though the update function in `openFrameworks` could easily write the Synapse's data, the draw function could not use the same variables to display shapes. After debugging, the program compiled fast enough that the variables were still empty when the draw function called them. After adding some if statements and boolean controls, the program flowed in a better order. After the program flow was fixed, development proceeded to creating nodes to display all the joint data. This process revealed more about the Kinect's skeleton reading and provided feedback for `openFramework's` 3D space. Some flipping of the Y coordinates and mapping of the data to fit the `OpenGL` Window were necessary to bring the visualization into view. The application was then adjusted to save images of the visualization. The program sometimes produced corrupt PDF files and other times valid ones. The primary problem with this iteration was the poor positioning of the graphics within the `openFrameworks` window. Adjusting the joint position data as it comes in by mapping it to the screen had been helpful. My latest efforts have involved trying to use an OF camera to simply look at the graphics from a different perspective. After studying the 3D camera examples included with OF, the next approach was to translate the world coordinates to the dimensions of the Kinect's view. A Kinect object was created and its width and height pulled for the window dimensions. What resulted was simply a smaller version of the same problem. The visualization was still caught in the upper right quadrant of the screen. Mapping the coordinates to the Kinect dimensions after they came in from OSC did not fix this issue with the graphics. The information from the Kinect and it seems any other camera device, came into OF upside down so the common fix is to use `ofScale(1, -1, 1)` to correct this. The side effect from this scaling, however, is that the graphics for the joints of skeleton data walk off the screen. To fix `ofTranslate(x, y, z)` was used to reposition the graphics. The application was using `ofTranslate(ofGetWidth/2, ofGetHeight/2, 0)`, though and this was causing the shift to the upper right quadrant. The graphics were drawing from the repositioned (0,0) point, the center of the screen. While `ofScale(1, -1, 1)` flipped the graphics back to the correct direction, the graphics drew from (0, -height). The graphics started in the center of the screen with `ofTranslate(0, -768, 0)`.

The advanced 3D Example introduced the viewing frustum. The viewing frustum is the space captured by the camera and also

the virtual space represented as basically inverted on the screen. As one gets closer to the real world camera, the Kinect, its real world frustum gets smaller. However on screen, the skeleton graphic appears to move into the wider area of the frustum as this occurs. In this iteration the graphics were centered in the screen, but the 3D illusion was not effective because real world movement did not translate to visibly large changes on screen. If the application could correctly position a camera on the scene, the user should be able to see the dimensionality of the 3D graphics rather than a very 2D looking representation.

This called for up the camera correctly to view the scene. At first the camera was set to track with the position of the user's head. As the user's head moved from side to side and up and down, the view of the scene adjusted accordingly so it seemed as if the user were looking into a room. This perspective would be useful had that been the goal of the project (to look into a room), but the camera is actually supposed to show the viewers a view of themselves. This problem with the camera placement was revealed in testing because the 3D graphics only extended slightly beyond the user in the visualization. In the 3D space created to view the 3D motion, a mistake had been made of "holding the camera." This was fixed by simply making the camera track the z-coordinate position of the user's body in the negative.

One of the next issues discovered with the tracking is the Kinect and `OpenNI's` behavior when too many joints go out of view. The Kinect has a minimum distance of about 6 feet for one user, 8 feet for two (although this has decreased for the XBox One sensor). Translating the real world space to the screen space revealed some potential problems. Users could "dive into" the graphics within a small distance between the Kinect and the back of the real world frustum. The graphics reacted most sensitively to the motion within this space. Advancing closer to the Kinect beyond this point caused too many joints to drop out view for `OpenNI` and the Kinect, so the graphics "died" at that point. The same thing happened when users backed up too far and passed beyond the "back wall" of the real world frustum. To keep the tracking going for as long as possible, tracking the z-coordinate of the user was testing on different joints. The head and feet were the worst joints because they were the first to disappear from view and also the joints with the largest range of motion. Using these two caused the visualization to move too erratically. However, using a joint such as the torso provided so much stability that the visualization didn't have enough movement. What worked best was tracking a hip joint, which had enough movement for tracking a person dancing but a small enough range of motion to keep the visualization stable enough that viewers could understand what they are seeing.

In this iteration displaying the output on a larger screen was tested to see if viewers can better connect with the size of the motion graphics in human proportions and from there dance movement. Viewing the visualization projected on a surface, however, made

some adjustments apparent. The visualization would need to “stand” at the bottom on the projected surface. The two foot joints for the skeleton data would need to be at the bottom of the screen so that when projected a viewer can feel as if he or she is standing next a figure of typical human height. The visualization currently sized the skeleton so that it was near the top of the frustum, so it was small and centered on the screen.

Solving this needed a few considerations. The figure could not move into the middle of the visualization as the tracked user moved backwards because that would not mimic real life. Thinking about it more it seems like the motion would only seem realistic if it remained at the “front” of the screen, that is as close as possible to the viewer without disappearing out the bounds of the screen to preserve the illusion of 3D space. The wall could be thought of a window into a space extending beyond the wall. This seemed to be the most logical interpretation for the visualization. In the final test of this iteration, the projection was accompanied to salsa music and volunteers were invited to test the tracking of the visualization by dancing or moving in front of it. Compared to its first iteration, the visualization had come to a point of providing a visually pleasing and engaging interactivity while capturing useful recordings of tracked subjects.

The major implications for the quality and accuracy of the data are related to the Kinect’s infrared sensing. The Kinect’s infrared sensor collects its depth data, i.e. the position of the joints and body sections along the z-axis. The challenge with this set up is that, unlike a motion capture system which uses multiple infrared cameras surrounding the subject, the infrared tracks movement from one position. If the subject stands facing the Kinect with his body flat against the x-y plane, the Kinect can track the joints easily. However, when the subject turns to the side, tracking problems begin to occur because certain joints are occluded by the body. If a subject turns around fast enough to face away from the, the Kinect may still interpret his body as facing it. Multiple infrared sensors would provide additional depth data to resolve where joints are located when they disappear from the view of another infrared sensor.

Another issue for the data concerning the Kinect’s infrared sensing is the spacial range of the sensor. When a subject goes too close to or too far from the Kinect, the Kinect stops tracking her skeleton. However, this is interpreted as a pause in movement. The Kinect sends the message that the skeleton is at a stand still in whatever position the user left it. Once the Kinect detects the user’s body again, the skeleton is re-aligned, though not always properly, to the body. This creates a series of false values in the data set of the subject standing in an awkward position. The Kinect does not detect when a different subject has entered the recording. One subject can leave the depth sensing space and a different subject enter it and the Kinect will assume it is the first subject returning. Because of this keeping the infrared sensors depth range clear of other subjects and bodies that can be accidentally interpreted

as a person becomes more important and the recording of one subject may accidentally turn out to be the recording of multiple subjects. From these observations, what makes the Kinect advantageous as an inexpensive motion capture tool also makes it less effective as robust and accurate motion tracking tool.

A JOURNEY IN NEW POSSIBILITIES FOR RESEARCH METHODOLOGY

One outcome of this research investigation is that the data visualization serves as a form of imaginary media for cultural anthropology’s research community. The imaginary media of this research investigation would be an alternative method of communicating the knowledge of cultural inquiry. In addition to a written or videotaped account of observations collected while immersed in a dance community, the tool offers a new vantage point of exploration of data collected from the particular gesture or set of movements under study. Visualizing motion data for this purpose serves as a form of imaginary media because it envisions a new method of documenting and interpreting the cultural significance of movement. While traditional ethnographic research can accomplish this, analyzing abstract motion data may reveal insights that would be overshadowed by details of manner of dress, ethnicity or body shape or undetected in the speed of the motion itself.

REFLECTION ON RESEARCH AND RECOMMENDATIONS FOR FUTURE EXPLORATIONS

The outcome of this research investigation was the creation of a motion data visualization program that exports positional joint data over time and snapshots of the visualization program as it processes incoming data. Researchers can explore a subject’s movement during the recording process by adjusting camera views on the visualization. The data collected during the development of the visualization is primarily from volunteers rather than representative members of the local salsa dance community. The visualization is useful first step in determining what role digital technology can play in supporting the research methodologies of anthropologists.

The potential future outcome for this investigation is research and development of new and accurate tools to aid cultural anthropologists in their data collection for ethnographic research. The outcomes of this investigation show that inexpensive, commercially available markerless motion capture has potential for helping researchers record observations of movement, but that potential does not yet meet the fine grain precision of observation that anthropologists need in interpreting the significance of movements. The Microsoft Kinect captures data for major joints and sections of the body. Some of these joints and sections are not primarily responsible for the intricate movements of salsa dancing that create differences in style. Even in tracking the whole hand and the whole foot, the Kinect misses the minute flourishes of fingers and twisting of feet that dancers with a ballroom dance background may use to add extra glitz to their moves. Any motion capture system investigated in the

continuation of this research will benefit from being more sensitive to the particular movements of salsa. Position of the individual fingers, the foot in relation to the leg and ankle and rotations of the hip and shoulders are of particular interest when observing the differences between salsa dancers.

Understanding what is and is not of particular interest when observing salsa dancers is a skill I developed prior to this investigation in the real life context of a dance venue. The implication of this is that, while digital media and technologies can assist researchers in recording data about subjects, the final interpretation will rest with the researcher. One of the ideas I held at the beginning of this investigation is that abstracting the movement of dancers as a data visualization would make it easier for researchers to compare and contrast dance movement. With the physical appearance of the dancers gone, the researcher could focus solely on analyzing the dancer's moves. However, if an anthropologist should analyze culture using Clifford Geertz' interpretative approach, then motion data visualization would benefit anthropologists more if viewed in the context of the live observation. Other factors, such as style of dress, physical build, the general atmosphere of the dance venue, can offer additional insight into why a dancer is dancing as she is and possibly normalize variations within her own movement. The background an anthropologist develops in studying a community first hand makes a valuable contribution to interpreting the data.

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ARCHAEOPHONY: (RE)CREATING ANCIENT SOUNDSCAPES

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ABSTRACT

This paper results from my participation in an interdisciplinary research project titled *City Life: Experiencing the World of Teotihuacan*. The aim of the project was to present daily life in the Mesoamerican city of Teotihuacan at the time of its peak, around the year 250 AD. I was involved in the conceptual development of the project as well as the exhibit research and was enlisted to create soundscapes depicting the sonic ambiance of certain central locations in the city of Teotihuacan for presentation in a purpose-built listening environment utilizing advanced 3D surround sound technology.

Sound has a unique ability to evoke, delineate and describe different spaces and trigger memories and associations to activities and situations and thereby offer unique insight into time, place and culture. Digital audio technology, especially technologies for immersive sonic spaces, can be utilized to create an *archaeophony*, a sonic environment constructed based on the archaeological record and transform how archaeological data is presented, experienced and understood. This paper discusses the rationale for using sound to present archaeological findings, with the research and compilation of material for this particular project at Teotihuacan as the starting point.

INTRODUCTION

This paper results from my participation in an interdisciplinary project focusing on the Mesoamerican city of Teotihuacan, located about 40 km northeast of Mexico City. The project, titled *City Life: Experiencing the World of Teotihuacan*, was initiated by the Museum of Anthropology at Arizona State University in the US in 2003, with the bulk of the research on site in Teotihuacan taking place in 2007 and 2008. The final exhibit of the project was held from September 2013 to May 2014, however in a format that was significantly more scaled-down than was originally planned.

Teotihuacan as an archeological landmark and world heritage site is mostly known for its immense pyramids, which are among the biggest in the world and its impressive main avenue, *The Avenue of the Dead*, 40 meters wide and more than 3 km long. Teotihuacan was a major prehistoric urban center that rose in the first or second century BC and lasted until around 700 AD, when it saw a relatively rapid collapse, most likely due to internal political upheaval that reduced the power of the elite and thence its overall political influence and prestige in the region at the time. The population of Teotihuacan decreased, but the area was never completely abandoned. The name Teotihuacan, meaning "The birthplace of the gods," was given by the Aztecs, who encountered the city several hundred years after its heyday. Most of the early descriptions we have of Teotihuacan come from the Aztecs. No grammar or phonetics of a written language have been identified

that originates from the Teotihuacanos themselves, so there are no written sources from them directly. [1 - 3]

The aim of the project was to present daily life in Teotihuacan at its peak, around the year 250 AD, when it was the sixth biggest city in the world with a population of at least 80,000 people living in the urban center or an estimated 250,000 when also counting surrounding areas with close ties to the city's markets and services. I was involved in the conceptual development of the project, which started already in 2003, as well as the initial exhibit research in 2007 and 2008 and my task was to create soundscapes depicting the sonic ambiance of certain central locations in Teotihuacan for presentation in a purpose-built listening environment utilizing advanced 3D surround sound technology. The 3D listening space for the exhibit was originally planned as a "room within the room" in the exhibition space, intended to incorporate a 36-channel (5th order) ambisonic surround sound system, but due to change in personnel and funding structure for the project, it was unfortunately not built for inclusion in the final exhibit. Research and preparation of the sound material was done with such an immersive listening environment in mind, however and this paper will primarily concentrate on the process of choosing and collecting material and my approach toward composing soundscapes as a means to convey archaeological data.

ARCHAEOLOGY AND SOUND

Archaeology is about making sense of the past by gathering evidence from where ancient peoples lived and worked, interpreting the evidence and telling the story of how they lived and worked. Traditionally, the evidence on which the lives of people of ancient cultures were mapped was found in material remains. Elusive elements such as sound have largely been left out of the story. However, this is beginning to change as technologies and methods that look at a greater variety of evidence in and around archaeological sites, including sensory information, are employed. [4]

Sound is an inherent quality of things and activities. Different materials have different sonic qualities and different uses of things produce different sounds. Sound has a unique ability to evoke, delineate and describe different spaces and trigger memories and associations to activities and situations and has the potential to offer insight into time, place and culture in ways that are different from text and visual cues. Conventional archaeological exhibitions are primarily centered around exhibiting material remains. Incorporating the sounds of such objects being handled according to their assumed purpose and context adds another dimension to the understanding and insight into the objects and the places and situations associated with them. Utilizing digital audio

technologies, especially technologies for immersive sonic spaces, makes it possible to manipulate and present complex acoustical features such as directionality, density, distance, movement, envelopment and perspective in ways that transform how archaeological data is presented, experienced and understood. The audience can be put in the midst of an *archaeophony*, a *sonic environment that is constructed based on knowledge extracted from the archaeological record*.

SOUNDSCAPE AND ACOUSTIC COMMUNITY

The term *soundscape* is used in the literature in a variety of ways to describe the interplay between an environment and the sounds in it. The concept of the soundscape often implies a human/nature interaction, as the emphasis tends to be on how the soundscape and its components are perceived by the individual or a community. The term is used in connection with actual sonic environments as well as constructed, virtual sonic environments, such as immersive computer games or certain forms of electroacoustic music. Soundscape analysis can be listening-based – mapping of sounds heard at a specific location by listening alone – or instrument-based using audio recording devices and digital measurement tools. The inhabitant of an environment is both a sound producer that contributes to the soundscape while going about daily tasks and activities and a sound percipient that hears and reacts to the acoustical feedback of the physical surroundings and the sounds produced by others – the action and reaction that categorizes interaction in social and cultural contexts. Thus, the sonic environment is a dynamic flow of information and response being exchanged between inhabitant and environment. [5]

There are two approaches to analyzing soundscapes that I have found particularly helpful when developing the investigative framework for composing archaeophony. Firstly is the model of soundscape ecology proposed by Krause and Pijanowski et.al., where sounds are categorized based on the origin of their source:

biophony: sounds created by non-human biological organisms, from microfauna to megafauna

geophony: non-biological sources of natural sound and sounds of geophysical origin, such as wind, water, thunder, volcanoes, earthquakes, etc.

anthrophony: sounds caused by humans, both intentional and incidental, including sounds of human-made tools and machinery. Soundscape ecology combines elements of landscape ecology, bioacoustics, psychoacoustics, geophysics and other related fields to create a multidisciplinary model where the components of biophony, geophony and anthrophony together form the complete soundscape. The feedback mechanisms of elements of the soundscape influencing the sound producers and vice versa are recognized. Another important aspect of soundscape ecology is the niche hypothesis that suggests that sounds of biophonic

origin are partitioned into temporal, spectral and spatial niches where different animal species occupy different frequency ranges, temporal ranges and spatial ranges in the natural soundscape. The distribution of acoustic niches is an indication of the health of the ecosystem and the relationships of the species inhabiting it. The categorization proposed by the model of soundscape ecology is useful for sound source identification and classification of components needed in the composition of the archaeophony. In the research stage of developing the archaeophony, the model is also helpful for identifying the archaeological speciality which is likely to be the source of relevant information for investigating and determining specific and potential sound sources. [6], [7]

The second approach to soundscape analysis is found in R. Murray Shafer's and Barry Truax's work on acoustic ecology, including the theory of acoustic communication, which looks at the relationships and interactions of living organisms and their acoustic environment from primarily a semantic point of view. It has more of a human-centered bias than soundscape ecology and seeks to describe features that define sounds of particular meaning and value to a locality or community. Hence, the analysis and categorization of components in the soundscape are intrinsically linked to the social, communal and environmental contexts in which the sounds exist. From this point of view, the experience of the soundscape is different for each individual inhabiting the community and also different for people visiting from outside of the community. Central notions of acoustic ecology are:

keynote sound: sound that is heard frequently enough by a community to form a background against which other sounds are perceived
 soundmark: sound that is unique to a community or has qualities that makes it particularly noticed or regarded by that community
 sound signal: a foreground sound toward which attention is particularly directed
 Inhabitants of the community are likely to perceive keynote sounds and soundmarks differently than visitors, who may hear them as sound signals or, depending on circumstance and intensity, not take notice of the sounds at all. The meaning attributed to certain sounds, whether perceived as keynotes, soundmarks or sound signals, is also likely to be different for visitors than for permanent members of the community. Sounds that bear particular communal significance and the effect of the environment upon the sounds, can be said to bind people together as an acoustic community. Acoustic ecology, therefore, helps direct attention toward sonic specificities of a community tied to a location and provides a helpful tool for recognizing aspects of the soundscape that can aid in creating a sense of place in which the community is situated. [8], [9]

ARCHAEOPHONY

The archaeophony is a sonic environment intended to provide auditory information that triggers a sense of a certain place and time and is informed by and ties specific agents, actions, situations and spatio-temporal layouts to that place and time. A key function

of the archaeophony, therefore, is to point to a context outside of itself and provide a link to the sound producing environment and socio-interactive settings it seeks to present.

Depicting urban sonic ambiance of nearly 2000 years ago requires a broad interdisciplinary approach. Some established disciplines investigating aspects of sound in ancient cultures exist, such as music archaeology, that specifically looks at musical practices, including song, dance, instrument building and rituals involving music and dance and archaeoacoustics, that primarily studies acoustical properties of ancient spaces and instruments as well as listening practices of ancient societies, mainly related to ritual and ceremony. My work draws on these fields, as well as several others, archaeological and non-archaeological.

As sound has no material remains, there is nothing there that can be dug up and directly utilized. Any component of the archaeophony has to be inferred from data unearthed in a relevant field that studies sites, cultures and activities of the past. Archaeology itself has numerous sub-specialities, such as archaeoanthropology, ethnoarchaeology, archaeozoology, archaeobotany, geoarchaeology, bioarchaeology and others, that each contributes to the archaeological record in a unique way. There is a significant amount of detail available both as material remains – more than a million artifacts have been recorded in Teotihuacan – and as hypotheses deduced from the remains. A selection has to be made based on the focus of the archaeophony, which in the case of this project is the sound of a day in the life of the city of Teotihuacan with the aim to bring to life experiences of ordinary people of this ancient city and provide a context and enrich visitors' understandings of complexity and nuances of Teotihuacan society.

Like urban centers today, Teotihuacan was a city filled with sound. It may be challenging for modern audiences to imagine a busy urban soundscape without the sound of vehicular traffic, industrial machinery, roaring ventilation systems, sound signals at pedestrian crossings and the occasional helicopter and airplane flying overhead. While these were not yet the sounds of the urban environment, there were, however, other sounds of familiar activities, such as cries of vendors at the market, digging and scraping at construction sites, children playing, food sizzling and people gathering and conversing. The Teotihuacanos had no wheeled carts, even though children's toys with wheels have been found. Remains of several hundred craft workshops and ceramic workshops have been identified, each of which would have contributed to the soundscape at the time. Knowledge of such activities is helpful for creating an image of key sounds and ambiances to incorporate into the archaeophony.

METHODOLOGY

Archaeophony is, as other archaeological presentations, an interpretation of archaeological evidence. The aim is to create a soundscape that is as true to the investigative results and current hypothesis as possible. However, in all practicality the

presentation of the archaeophony is likely to be time-limited within the constraints of the exhibition of which it is part. Further, attentive listening to soundscapes without a direct visual link is not a common activity among the general audience and the varying levels of listening experience, as well as consideration to attention span and ability to identify sound sources, need to be taken into account. This means, in order to convey as much relevant information as possible, the archaeophony cannot merely be a neutral snapshot of a time and a space. While the archaeophony should be believable in the known context, it cannot claim to be realistic as it is not possible to know exactly what constituted the soundscape at that place at that time. The sound material on which the archaeophony is based needs to be a representative selection of what may have been typical for the site, but may not necessarily be sounds that were likely to occur simultaneously or within the relatively short available timeframe of the orchestrated archaeophony. For instance, the afternoon thunderstorms and heavy rainfall that occur in the Teotihuacan valley in the summer are characteristic for the area and are likely to have shaped the daily rhythm of life in the city during that time of the year. At the same time, there are outdoor activities that may have taken place at other times of day when there was no chance of rain or even during other seasons, that also need to be included. Likewise, climatic features such as migratory birds that were present only during certain parts of the year may be incorporated in order to underline the importance of certain avifauna. Therefore, a selection of key sounds and sonic events that are particularly descriptive and representative, in this case of daily life in Teotihuacan, need to be made and orchestrated into a compressed narrative of coherent scenes. Just like the narrative of a movie can span a much longer time frame than the actual duration of the screening, so must an archaeophony compress time in order to present essential sonic events in an interesting, believable and informative way.

The method of collecting cues includes researching found tools, assumed activities, architectural layout, building materials, environmental features and other relevant characteristics and information. Field recordings can be incorporated as well, however, avoiding present-day elements of the soundscape may be a challenge and a good amount of knowledge is needed to know what was not present at the time. For instance, the now ubiquitous house sparrow was not introduced onto the American continent until the 1850s and, despite rapidly declining bird populations in our time, is now very difficult to avoid in a field recording in almost any urban area.

The theories of what is the story of the people of an ancient culture are based on materials from a variety of sources such as maps, photos, murals, objects, architecture oral histories and written records from contemporaries, descendants, later occupants, explorers and other cultures as well as agriculture, flora, fauna and geological data. For any specific auditory and acoustic feature that is found, there is the question of whether it was intentional or accidental. And with regard to sound producing objects, one

has to interpret whether they are musical instruments intended for sound production, perhaps primarily for ritual and ceremony or if they had other functions. For instance, objects may have been used to mimic animal sounds for use in hunting, clay vessels (pottery) may have been used as percussion instruments, certain necklaces and bracelets of shells or bones may have had a dual purpose of also being used as sound producing devices or maybe solely for generating sound, as we find in today's percussion arsenal. Further, there may be already catalogued objects that are mislabeled as something not related to sound when sound production may have been their main or sole intent. With musical instruments and other sound producing devices, playing technique as well as the social purpose of sound making may also be unknowns.

Source material of the archaeophony cannot be collected in the social context in which it originally occurred, but must be deduced from material remains, architectural and natural layout, acoustical features and impressions and experience of weather and geological features of the surrounding area. Likewise, the sound of tools, instruments and utensils in use most likely cannot be recorded using the original artifacts directly. One solution that was chosen for the Teotihuacan project was to engage artisans utilizing traditional materials and techniques to create replicas of such objects for the purpose of handling them specifically for capturing sound source material. Recordings were made also of the process of creating the objects as additional source material for inclusion into the archaeophony. Further, Foley techniques, known from film production for designing ambient and everyday sounds in a controlled studio setting as opposed to recording on location, are useful for developing sound material to incorporate into a believable archaeophony. Foley techniques are used for creating sound material with replica objects, but also with other devices that in and of themselves are not necessarily related to the archaeological evidence, but are still useful for developing plausible archaeophonic components.

SPATIAL STRUCTURE

Any sound has a spatial context – whether it is apparent in the recording stage or in the playback setting or both. For sounds recorded in a natural environment, the recorded sound carries with it information about the spatial environment in which it was captured, but also sounds recorded in a non-reverberant studio environment inherently contain spatial cues. Digital audio technologies, especially technologies for immersive sonic spaces, opens for enormous possibilities for composing archaeophony with regard to spatial structure. Taking architectural layout as the starting point, 3D surround sound technologies can be utilized to mimic acoustical properties of the particular archaeological site. For the Teotihuacan project, impulse responses, the recording of the reverberation – or “acoustical signature” – of open and enclosed spaces, were captured at the archaeological site for use in convolution at the post-production stage. Convolution using impulse responses is a technique of adding reverberation to a

sound in a way that aims to be realistic as it is based on recordings of sonic characteristics of real spaces rather than digital models. This way sound material can be incorporated into the recorded reverberation in order to put archaeophonic components into an acoustical space that is or is assumed to resemble, the space in which they were likely to have originally been heard. However, knowing the history of an archaeological site is important, as in Teotihuacan many of the structures in the public areas of the site were reconstructed and the acoustical authenticity of these structures is uncertain. [1], [10]

An immersive auditory space can utilize full surround sound possibilities in order to envelop the listeners with sound and create an experience of being transported to different environments with the aim to create a sense of “being there.” On the other hand, if the listening environment is directional, that is, if the visitors are facing a specific direction, placing the sound material in front of the visitor can, in a similar sense, transport the environment to the visitor, who in this case takes on an observing role from their “outside” position relative to the sound field. Regardless of directional layout of the listening space, dynamically working with foreground, middle-ground and background by manipulating distance, closeness and directional cues creates varying perspective with regard to the sound field and a sense of size and layout of the archaeophony as well as occupancy density and spatial distribution of sound producing agents. Playing with varying perspective ensures a certain level of dynamism, which again gives the visitor something to follow and hold on to. Hence, the archaeophony is orchestrated both as a temporal-structural composition and a spatio-structural composition. [10], [11]

The spatialization of sounds is determined by the architectural or structural layout of the physical site, but also by how the site is used. An archaeophony of a ceremony may incorporate the ceremonial arrangement where, for instance, the size and architectural layout of the ceremonial space indicates location of participants, location of audience, number of participants and configuration of participants with regards to audience. This is relevant if for instance it is important that the spatial structure of the archaeophony aims to give the visitor a sense of being in the midst of the audience at the ceremony.

TIME AND PLACE

An important aspect of the archaeophony is to establish a sense of the time and the place of the ancient culture. Humans have a natural inclination to try to identify sources of sounds and sound events and relate them to past experience. Source recognition links sounds to known objects and situations and to known actions or gestures in order to detect the possible cause of the sound. Hence, visitors' listening abilities and range of associations triggered by the sound material are highly individual and are based on knowledge acquired through real-life experiences. The understanding of the archaeophony will be filtered through this present-day understanding of the soundscape.

In terms of space, familiar environmental cues can indicate the possible virtual dimensions of the archaeophony as well as the listener's position (point-of-view) relative to the sound field. Recognizable geophonical material, such as rain or thunder, wind or running water, have associative powers that can trigger knowledge the visitor has from past experience of places with similar features, whether mediated or in real-life. An experienced ear may be able to detect more specifically geological features of the area, especially with sounds covering large distances, such as thunder or the sound of an erupting volcano and recognize sound propagation typical of a valley, for instance. On a smaller scale, the presence of buildings and other structures can be perceived via perhaps more familiar patterns of reflections and absorption. The resolution of human spatial hearing is sufficiently detailed to be able to detect such layouts by listening alone and varying the auditory information by utilizing acoustical cues of different indoor and outdoor spaces and layouts contributes to establishing a perceivable spatial setting for the archaeophony. The ancient soundscape was of another richness than our present urban soundscapes due to its higher level of acoustic transparency. Without the ubiquitous roar of the combustion engine and other more or less constant background sounds heard today, more subtleties were apparent due to (most likely) lower ambient noise level and detail could be heard at longer distances with a greater sense of perspective. Listeners of the past could therefore take in auditory information of their city differently from what we are able to today. Due to the higher resolution of such a "hi-fi" soundscape, where sounds overall tend to be heard more clearly, the premises of engaging interactively with the soundscape are potentially better, which may have meant the sense of hearing had a higher communicational significance than is possible in today's urban environment. However, we cannot escape the fact that we are shaped by our modern-day existence and current auditory experiences and making assumptions of how peoples of ancient cultures experienced their contemporary soundscape may be presumptuous. [9], [12]

One important consideration when composing and presenting the archaeophony is how much to rely on the visitors' ability to accurately identify sound sources and acoustical characteristics that are intended to communicate the time and the place of the archaeophonical setting. Precise recognition of sound source and/or sound producing gesture assumes that the listener already has a frame of reference of the sound or action from past experience or from knowledge acquired specifically for interpreting the archaeophony. However, only specialist audiences can be expected to identify ancient sound producing devices by listening alone and ability to recognize the sound of certain objects being produced or used does not necessarily mean an equal ability to identify characteristics of other acoustical components of the soundscape. The archaeophony may therefore be seen as one component in a greater context of investigating and disseminating knowledge about ancient cultures. Its uniqueness lies in highlighting and conveying elements of the archaeological record

that traditionally have not been emphasized and in that way contributes to the story of ancient peoples by adding to the investigative framework as well as the base on which to build understanding and knowledge of ancient cultures.

CONCLUSION

We can to an extent replicate the production of sounds of the past, but we cannot replicate how the sounds were perceived, responded to and used. Our modern day experience will remain our reference. Current audio technologies can, however, be utilized to create an archaeophony that is sufficiently detailed and acoustically plausible to present archaeological data in ways that make possible a new level of understanding, experience and engagement and can bring to life the story of the people archaeology attempts to tell in ways that visual cues and material remains alone can not.

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FACING INTERACTION

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ABSTRACT

In this paper, we present four interactive artworks – all of them in progress – that explore the use of face-based interaction in art installations investigating the possibilities of non-verbal communication.

INTRODUCTION

In this paper, we present a set of works in progress that explore the use of face-based interaction in art installations. These artworks offer different approaches to the question of how can we communicate sensations and emotional states, in non-verbal ways, to others, to ourselves, to objects or even to places? Under the assumptions that facial gestures could constitute a window to somebody's emotion, the art pieces aim to help reflecting on the poetics of non-verbal communication.

In the following sections we will describe five prototypes of artworks: *Walrus*, *Traces*, *Facial Pentatonic*, *Facial Sounds* and *Look at me!* We will conclude by presenting a short discussion and our future related works.

WALRUS

I am he as you are he as you are me and we are all together. (John Lennon, lyrics to The Beatles' song *I am the Walrus*, 1967). Walrus is an interactive installation consisting of a oval framed "magic mirror" that only reflects the interactor's face, with the reflected image substituted in real-time for a previous interactor's face in similar position and facial expression. The system, for every frame, captures the user's face and stores it in a database. It then searches for a similar pre-stored face and displays it instead. Using a depth camera and face-tracking software, Walrus creates and manages a database of faces where each frame is classified according to its three-dimensional rotation plus some gesture descriptors. This classification of the stored faces allow for the real-time substitution so that, in every frame, the user's reflection consists of a different person's face. Walrus creates a sense of awe in the interactor that arises from the fact that even if the facial features in the mirror are completely different to the users,' the identification with the displayed image is natural, unavoidable and immediate. The unnatural fact of a mirror that only reflects the face and does not follow optics rules (the reflected face is always centered in the mirror) creates a tension that interactors systematically alleviate by selecting a "physically correct" position.

"Magic mirrors" (also called "augmented-reality mirrors" or "mixed-reality mirrors," among other similar names), that is, computational mirrors that behave in creative ways are very common in new media art and with the advent of depth cameras a resurgence of this ever-present type of installation has been seen. Among all the existent works, it is perhaps Chris O'Shea's *Body Swap* the one closely related to *Walrus*. [1]



Fig. 1. *Walrus*, Prototype installed in Microsoft Research, Redmond, WA. 2012.

TECHNICAL DETAILS

The installation is composed of a Microsoft Kinect Sensor (first generation), computer running custom software, a projector and an oval-shaped picture frame. As with the rest of the pieces presented in this paper, we utilize the depth camera to track the interactor's head and Microsoft's Face Tracker to locate the face and extract some gestural features: mouth openness, rising of eyebrows, mouth general shape, among others. The computer stores each new face and its associated data into a database and returns an existing equivalent one from the database. We organize the database as a hash table, with similar faces stored under the same hash entries. Face similarity is defined by a L^∞ norm of the head rotation plus similar gestural features. When a new face is detected, it is stored into the hash bucket with the most similar representative. To avoid running out of storage, we cap a maximum size of each hash entry and randomly kick out an existing entry when this limit is reached. We then randomly pick another face from the same hash entry. This can be seen as a cheap way of finding similar faces to the input via hashing. The projector is mounted either on the ceiling or on top of a tripod that allows the returned face to be projected onto the oval picture frame without the interactor casting a shadow onto it.

TRACES

What is our relationship with the architectural spaces we inhabit? *Traces* is an interactive installation that tries to help in answering this question.

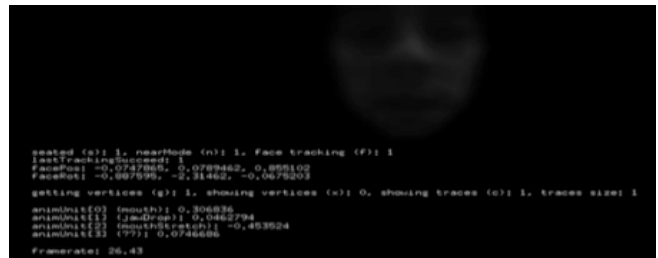


Fig. 2. Screen capture of *Traces*' software, showing an acquired face and running information and parameters.

To experience *Traces*, the interactor arrives to a dark area within the gallery space. In a wall, the interactor will find several faces projected on the walls. Subtle ambient sound is played. Every face is drawn with its eyes closed. When a blink is detected, the computer extracts a bitmap corresponding to the user's face, desaturates it and slightly blurs it. It then adds to the collection of faces that is projected. The spectator then becomes part of the installation. The artwork becomes, then, a testimony of the visitors to the room, inhabiting it but not seeing it. In *Traces* visitors become subjects of the room, recipients of the spatial communication. *Traces* reflects on the relationship between people and the spaces they inhabit: is a space changed because we have been there? Do we leave any trace on the places we have been to?



Fig. 3. *Traces* prototype as installed in the School of Creative Media, City University of Hong Kong, 2014.

The piece also questions what we actually see and experience from a specific space. *Traces* is a log of people not seeing the space where it is exhibited, a rendering of some *traces* we might be unaware that we leave behind. *Traces* also becomes a communicational vector between different visitors, as every spectator contributes – albeit passively – to how the piece looks at any time. However, the piece is always changing and every interactor contribution, every trace, fades out with time. The piece stores every participant's faces, becoming a witness of all its visitors in the moment of helplessness that their momentary blindness generates.

TECHNICAL DETAILS

Traces is composed of, depending on the specific space where it is installed, one or various depth cameras one or various projectors, a computer and custom software. After one spectator has been tracked for thirty to forty-five seconds, the installation enters into blink-detection mode for that spectator. If there are more than the maximum of images – dependent of the specific gallery space – the oldest projected face is slowly faded out.

Our custom blink detector utilizes a computer vision library (OpenCV) to extract one RGB bitmap per eye and raise a blink event when the bitmap changes more than a certain threshold. [2] Change is measured by binarizing the images, applying a

Sobel filter and verifying that the resulting images shows no more than one continuous blob. The Sobel operator performs a 2D spatial gradient measurement on an image emphasizing regions of high spatial frequency that correspond to edges.



Fig. 4. Our custom blink detector. On the left the extracted eyes are drawn. On the right the detected blob is drawn, signaling the detection of a blink.

The collection of faces stores the extracted images and displays them. The size of the projected faces is configured depending on the installation space. Also based on the installation space the maximum amount of projected faces is selected.

FACIAL PENTATONIC AND FACE SOUNDS

Facial Pentatonic and *Face Sounds* are two musical instrument prototypes that map the user's face onto sound production. In *Face Sounds*, the user's head orientation and facial expression are mapped onto continuous parameters of a MIDI synthesizer instrument running in Ableton Live (a digital audio workstation specialized in real-time operation). [3] Users trigger the sound by opening their mouth. The instrument embodies a virtualized voice that is controlled by the head's orientation. *Facial Pentatonic* is a similar musical instrument, also triggered by the user's mouth, with the difference that the interactor's head orientation is used to directly select the note being played instead of modifying timbral parameters. The user head's pitch selects the octave, while the head's yaw selects the note within the scale (pitch corresponds to left-right rotation, as in the western "no" gesture; and yaw corresponds to up-down rotation, as in the western "yes" gesture). The system provides real-time visual feedback, showing the selected note. Its hands-free interaction allows the user to play another instrument at the same time (again, it becomes a virtualized, always-on-tune voice).

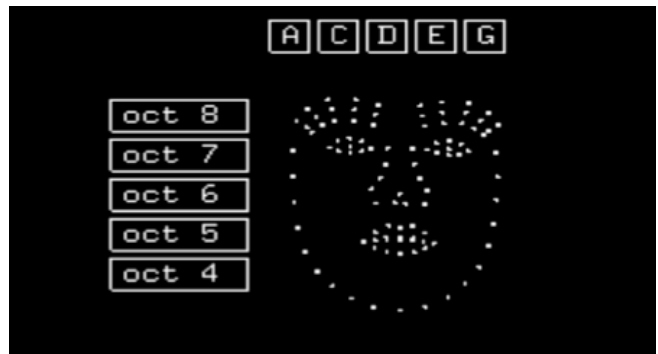


Fig. 5. Screenshot from *Facial Pentatonic*, showing the tracked face and the selectable octaves and notes.

The system allows the user to select one note of the A minor pentatonic (five notes per octave) scale, which comprises the notes A, C, D, E and G.



Fig. 6. A user performing with the *Face Pentatonic*, with the G4 note selected.

LOOK AT ME!

Another line of work consists on investigating vibration as feedback. Vibrating motors are very cheap and easy to control providing an interesting (and popular) opportunity for artistic appropriation.

Look at me is a prototype of vibration-based feedback: a small installation that attempts to forcefully capture the user's attention. It consists on a small object (in our prototype a plastic cup). After the user looks at it, the installation attempts to not allow the user look away. When the interactor starts turning his or her head away, it lights a LED up and emits a soft high-pitched tone. If the user looks further, it vibrates and produces a loud buzz. The installation aims at subverting the power relationship between the observed and the observant, between consumer and product.

DISCUSSION

In spite of face tracking being widely distributed in consumer electronics, it is still not very frequently used in interactive artworks. The pieces described in this paper try to show that there are many possible uses for interaction based in face tracking within new media art.

In *Look at me!* Face-tracking is not used directly but instead works as an estimation of the user's attention. Even if more precise methods exist (e.g. gaze estimation), *Look at me!*'s heuristic is accurate enough so that the users can correctly understand the installation's working and intention.

More widely explored is the use of face tracking for directly controlling music instruments, with perhaps the first example using a personal computer would be David Merrill's 2003 guitar effect controller. [4] Our prototypes show that designing this type of interaction is easily feasible with available devices, opening interesting interaction design alternatives. The artworks *Walrus* and *Traces* combine spatial augmented reality with face-tracking, showing that it is possible to investigate in alternative modes of communication within media arts and architectural research. The ability of detecting blinking or to "understand" a face gesture in

real time offers the possibility to create behaviors that inspire feelings of awe in the audience while opening new modes of interaction with the spaces users inhabit. *Walrus* spatially augments the oval frame granting it the affordances of a mirror. With its radical change of functioning, it aims at reflecting on self-perception, artistic exhibition, surveillance, control and public entertainment. *Traces* shares the same conceptual space but explicitly includes the architectural space in its interaction proposal. In both artworks, the inner working is not apparent to the users, allowing for reflection on the contemporary panopticism.

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MULTI-USER-BODY PERCEPTION IN BODY-MOVEMENT-INTERACTIVE DIGITAL 3D DIMENSIONAL AUDIO/VISUAL INSTALLATIONS

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ABSTRACT

This PhD research thesis summary is based on arts-practice-led research exploring interactive digital environments, perception and consciousness. It brings attention to how technology is changing our mind/bodies and can affect the way we perceive, which informs the conceptual interactive designs that intervene with body perceptions. The installations explore human computer interaction (HCI), from an embodied psychological perspective. The interactive installations concentrate on aspects of the body in the way it enframes or moves to achieve perception, imagination and consciousness. It explores creative interactive experience within body-movement interactive-installations. The research combines 'creative interactive' with embodiment/disembodiment theory, as a way of rethinking the body and aesthetics in interactive installations. A series of interactive 3D audio-visual installations were designed to cause the experiencers to engage their body perception and consciousness that go beyond the human-computer interface and focuses on creative imagination, by extension of the body. It questions and explores body perception awareness in new media interactive environments. It importantly concerns "experiences that are integral to the development of virtualized body experiences. The research examines current theories of body perception, which informs new media interactive experimental practice and its effect on aesthetic experiences.

INTRODUCTION – AIMS – OBJECTIVES

The approach in this research examines the theories that surround human body perception, concerning the body as central to perception, in the context of body-movement-interactive-digital-audio/visual installations. This research broadens an understanding of body perception and consciousness in interactive art installations and how the body is being transformed by technologies which is 'naturalized' to certain kinds of interaction with digital technologies.

I am interested in how body-movement interacts with virtual technologies. Body-movement-interactive interfaces have been explored by the efficiency of human computer interaction (HCI), in science and sociology. Importantly in this research I am studying (HCI) from the psychology of body perception of visual and sound. The context is a series of interactive art installations in which the body continuously moves to interact with computer digitalized audio/visuals. By enhancing perception through digital means, of visual and sound displacements, the 'experiencers' have to re-engage their next body movements, which leads to exploring a changing and evolving embodied perception. It is conjectured that these interactive installation causes the participants body to move differently and to continuously preform, through a newly obtained body-memory attained from kinaesthetic memory 'proprioception,' which is continuously changing and evolving. So by doing this the installation is exploring body-movement perception, embodied

movement awareness and an aesthetic of behaviour. To see if the changes and adjustments made by the body of the experiencer caused by intervention of the interactive environment open a participants awareness and alters perception towards a more creative response from the individual and *virtualized body experience*. That goes beyond the cultural body inscriptions that inform our thought systems and also therefore by definition embodied perception.

The active realization of body-movement perception is an alternating or a parallel manifestation of reflective and immersive moments. Aesthetic distance or reflection is possible and is an essential counterpart for body self-reflection. Aesthetic experience of interactive art is especially shaped by the interplay between immersion and distance, for only in this way can one's own actions become available as an object of reflection, in the audio-visual world of the installation.

METHODOLOGY

This artist-led-research developed its inquiry through parallel experimental and conceptual frameworks. The development of this approach was informed by body perception philosophy & theory, HCI frameworks used in artists interactive installations and contemporary artist's interactive work that involves the body, as interactive. The experimental interactive installations were applied to explore the questions and hypothesis. The conceptual frameworks from theory have been examined to place my hypothesis in context and to show why this research is significantly new and important.

THEORETICAL FRAMEWORKS

I began in this research to formulate questions, surrounding *body-movement* interactive digital audio-visual installations, to form a concept and to find, how *body-movement-perception* can be utilized to enhance aesthetic imagination. A thorough reading of the philosophy of body perception, theories of body-sense, new media digital art and philosophy, human computer interaction, natural user interface (HCI) began to inform this arts research practice in body-movement-perception, in 3D audio-visual interactive environments.

I started by analyzing philosophy, new media theory, embodiment theory, Human Computer Interaction HCI, theories that were relevant to body perception and body-movement installations, to find if this was relevant to artists interactive installations and if a new aesthetic could be formed from such enquiry I also looked at science and neurophysiological evidence of body perception. The central framework was Mark B. N. Hanson's, 'New Media for New Philosophy,' (2004) and 'Bodies in Code' (2006), to develop my

theoretical, experimental and conceptual frameworks. [1], [2]
My aim was to discover the relationship between body-movement and body sense perception and interactive digital audio visual installations, from the point of view, of the affects the interactive virtual material and materiality of body-movement could have on the subjects' imagination and creative cooperation in interactive art.

Currently the body is thought to be more central to perception in the digital environment. These theories have been explored to develop the interactive designs and to discover relationships between the perceptions of 3D moving image and surround sound, by exploring body perception and consciousness. Central to this research is a series of experimental interactive art installations in which the recipients body' interacts with computer digitalized audio/visuals in a 'live data' environment.

There has been little research in Human Computer Interaction (HCI) experimented in the area of interaction with virtual 3D dimensional objects with body-movement. Some research has been undertaken in Health and Science and in (NUI) experiments, in replacing the mouse. Very little experiments have been tested using all body joints for experiments using (NUI) for the manipulation of 3D objects. Most of the practical and theoretical studies in this research are relevant to Post-Human research. One of my thrusts was to explore an area in interactive art, to see if dysfunctional movement can be aesthetically meaningful in the realization art.

CONCEPTUAL AND EXPERIMENTAL ISSUES THE WORK EXPLORES

Body-movement interactive and 'computer vision'

Research in 3D dimensional interaction in the virtual environment has had very little input, is still relatively thin considering that the VR and games industries depend on such technologies. The computer mouse or game controller, has been most used. The ocular Rift and other new VR technologies, does not have the facility for an interface that can control 3D objects. Interface Design has been a concern in the design of the interactive environment.

The interactive body and virtual 3D dimensional Movement

Body-movement has been explored in relation to the virtual 3 dimensional space in several interactive design's, it is the actions and interaction with virtual 3D that have been the concern. The design of the digital environments has drawn body perception theory, from philosophy and new media theory & philosophy.

Reciprocal Action in Interactive Installations (visual and sound perception) Introducing the Problem

To intercept proprioception at the body status of 'aesthetic reflection' causes a reforming of body-movement and mind. By intercepting proprioception a remodelling of the bodies underlying

inscriptions can take place. The complex digital environment of virtual audio-visuals, adds to the reason for exploring body sense in these installations. The interactive designs incorporate time factors that intervene and flush the digital data and code, to commence a new interactive cycle.

PHILOSOPHY – BODY PERCEPTION THEORIES

This practice-led-research explores interactive design technologies to make 'experience able' new forms of human body perspective perception that capitalizes on perceptual flexibility and aesthetic behaviour. I will develop the discussion from the view that visual and auditory perception are no longer thought to be the only prime sources of perception but it is the body, which is now discussed to be more important in the digital environment and which has informed the research here. These are discussed in relation to the 'interactive digital 'live data' environment and the 'interactive designs' in created in this research. Some older philosophies and newer theories that have seemed relevant to developing the interactive environment are Henry Bergson, Merleau-Ponty, Mark Hansen, Brian Massumi, Lombard and Ditton. Gallagher and Cole.

Mark Hansen's research in 'New Philosophy for New Media' (2004) and extended into 'Bodies in Code' (2006), follows a line of theories and conjectures, that the body becomes a more active framework for the image in the digital environment. [1] Hansen argues that media convergence under digitalism places the body as centrality, as a framer of information, as media loses their material specificity. The body takes on a more prominent function as a selective processor in the creation of images. Hansen following the early phenomenology of Merleau-Ponty and defends Henry Bergson's philosophical theory, which emphasized the role of the 'affective, proprioceptive,' and tactile dimensions of experience in the constitution of space and by extension visual media. He distinguishes between the 'body-image' and the 'body-schema,' and in summary it is the 'body in motion that is important.' Drawing on Merleau-Ponty's concept of the body scheme (the action-oriented, environmentally based self-perception of the active body), Hansen coins the term "body in code" to denote a technical mediation of the 'body scheme,' which is accompanied by a dissolution of the boundaries between body, real space and data space.

'Body Schemas' are an important concern in this practice base research of artist's installations, aesthetics and human computer interaction (HCI) and I have demonstrated and shown how this is important to an understanding and developing of new aesthetics, in the interactive digital environment.

Hansen went on to maintain "that the body continues to be the 'active framer of the image,' in the digital realm," and draws upon new media artists who deploy technology in order to pursue this 'Bergsonian imperative,' of the body 'enframing' the digital image. [1] Cognitive Scientists and philosophers Gallagher and Cole,

assert that the 'body-schema' is a system of 'motor and postural functions that operate below the level of self-referential intentionality.' It includes non-conscious, sensori-motor perceptions and actions, the parts of our bodies that we may or may not be aware of, which are activated when we move and interrelate in and with our surroundings. This is similar to Bergson's theory of 'proprioceptive' perception.

Theorists have argued for the importance of 'proprioceptive' as a kind of 'sixth sense,' which is more than enables, the body to orient itself through its habitual movement of space. Proprioception can be thought of as the recurrent patterns that form, as the body's sensory motors system generates microscopic transitions 'kinesthetic,' while negotiating time and space in the world. Choreographers and performance theorists and researchers often see dancers make mistakes based on such misrepresentations: "a dancer proprioceptive experience might experience his or her knee as perfectly straight, when it is in fact bent or a hand as directly above his or her head, when it is behind." However it is not only the *bodies* physically sense of *movement* in response to external stimuli; but bodies steer our emotional and intellectual reactions and they subtly mirror, embody and even abstract social, cultural and intellectual concepts.

Now that body sense is thought to be more of an 'active framer of perception,' it is especially relevant especially in the interactive digital environments. The body externalizes inside and internalizes space from outside via the body and its movements, in the digital virtual environment and therefore experiences 'self-visualization,' in a different way, which is a form of apprehending the next move.

Audio-perception theories have also influenced the research and are necessary to be aware of whilst designing the interactive installations. Sound in this research, is designed from a perspective of a dislocation of embodied meta-language. In combination with 3D movement which combines a sense of spatial dimension and extent. Verticality for example is commonly understood in the realms of pitch and harmony; i.e. high notes and low notes. There are rhythms, upbeats and downbeats, rhythms that can be grounded or floating; time can be suspended or moving forward. Sound affects the sensation of bodily position, presence or movement resulting from tactile sensation and from vestibular input. Distal theories locate the sounds we hear at an early stage of their causal sequence than proximal theories. Hearing causes spatial information, hearing might represent spatial content. It is known that we tend to look to where the sound is coming from and in the interactive space, to capture a sense of awareness of embodiment. Audio perception experiments have shown that physical hearing is quicker than auditory perception and shows that audio perception is first felt through parts of the body. It is these body-movement perception theories that I have integrated into my experimental research and concepts for the interactive designs into body movement interactive 'live data' environments.

BODY INTERACTIVE NEW MEDIA DIGITAL ART

I will discuss contemporary new media artists, media artists and arts research in this field, 1990s-2014, which have experimented in the field of body interactive new media art, which are relevant to this thesis to demonstrate what can be learnt from their experiments and how this has an impact on understanding a new aesthetic of body-movement installation in this research. It also places this research and its importance of the field of the body and technology in relation to new media interactive art. I have explored the creative potential implicit within the reconceptualising of human perception and as an active and fully rendering of body data. By opening extra visual modes of interfacing with digital information encoding the digital image, such experimentation foregrounds the specificity of human processing of image construction, thus drawing attention to the more central role played by embodied human framing in the contemporary digital media environment. At the same time it underscores the fundamental difference between human and computer processing. In so doing this double vocation manages to re-introduce this difference motivating such experimentation, the imperative to discover and make 'experience able' new forms of embodied human perspective perception that capitalizes on the perceptual flexibility, brought out in us through our coupling with the computer. To translate the micro-kinesthetic movements of the body into virtual transformations. What are the specific areas of interest and what ideas and positions have other artists/artist researchers, media artists, taken which is in relation to this thesis?

David Rokeby, Char Davies, Catherine Richards, Diane Gromola, Michael Scroggin and Stewart Dixon, Stelarc and Rafael Lozano-Hemmer's public installations have all explored body perception in interactive embodied environments. They have demonstrated by their approach, some aspects of what the interactive digital environment can do the body and to what can be achieved by engaging with the interactive digital audio/visual surround. This places the importance of this research in perspective with body perception and interactive installations.

Therefore the body experiences movement awareness, in a form of apprehending the next move. Aesthetic 'distance' and immersion can be elicited, by forms of body-movement in interactive-art, for example hesitancy and relearning states, forceful action, as opposed to 'immersion.' Katja Kwastek, states, "Aesthetic experience of interactive art is especially shaped by the interplay between immersion and distance, for only in this way can one's own actions become available as an object of reflection." [3] Marvin Carlson claims 'that states of flow impede reflexivity through the emerging of action and awareness the total concentration in the pleasure of the movement and the loss of sense of goal orientation.' [4] There are many different perspectives on whether Immersion reduces aesthetic perception and if states of reflexivity can induce this state.

Martin Seel in 'The Aesthetics of Appearing,' believes that the necessary condition for aesthetic experience is an appropriate

disposition on the recipient; he describes aesthetic perception, as always distinguishable by not being an exclusively purposeful activity and by being alert to a dysfunctional presence of phenomena. [5] According to Seel, when perception is sensitized in this way, it is able to detect a 'multitude of sensuous contrasts, interferences and transitions' that elude a conceptual definition and can only be felt in the here and now.

CATHERINE RICHARDS

Catherine Richards focuses on the virtuality that interpenetrates the body or materiality. Her work explores the extent to which the virtual has overtaken real life. Richards draws viewers into the actuality of their embodiment, in the early 90s she was experimenting with creating an experience of embodiment that was less dominated by vision. In her art video *Spectral Bodies*, Richards focuses on proprioception, the sensory system that uses internal nerve receptors at joints and muscles to give us the sense that we inhabit our bodies. *Spectral Bodies*, she draws upon exploring the possibility that proprioception, far from being secure except in instances of neurological damage, can quite easily be manipulated to give quite radical different experiences of body boundaries. http://www.catherinerichards.ca/artwork/spectral/spectral_statement.html.

Spectral Bodies consists of a videotape of various experiments that explore the limits of proprioception not as a medical or scientific actuality, but as a fiction that forms narratives. In the video Richards alludes to Oliver Sack's essay "*The Disembodied Woman*," in which Christine a patient lost her proprioceptive sense as a result of neurological damage. With great effort, Christine was able to learn how to sit, walk, stand, what she was not able to recapture was the sense that she was inside her body. She felt that she was positioned somewhere outside, forced to manipulate her body through conscious effort. In her art video, she conducts experiments in the lab, (Laboratory of Mark Green, University of Alberta), showing that the perceived boundaries of the body can be remapped by the low-tech method of stimulating the surface of the arms and hands with a vibrator. [6] The video shows her enacting the experiment with various blindfolded experiencers, who describe what they feel happening to their bodies. One woman feels that she feels her neck shrinking and then thickening, becoming like a bull's neck. The process continues until her head retreats into her chest, her shoulders forming an unbroken line across the top of her body. Another woman remarks that her arms are growing longer and longer, stretching six feet away from her body.

Her work explores more than any other artist, that by exploring or intervening with 'proprioception,' that the relationship between virtual is taking predominance over the body. In 'Virtual Body' (1993), she states that "Placing the hand through the side opening onto the floor (computer screen), triggers a set of perceptual and proprioceptive reactions. This disturbs the spectator's sense of presence." The recipient shifts from a state of a first person to a

virtual body. Richards demonstrates by her work how we engage our anxieties and surrender to technologies. Particularly her work shows how technologies are questioning our understanding of our own subjectivity.

STELARC

In viewing the body as more relevant in the perception of art and aesthetics, Stelarc's work suggests that the body is fit only for experimentation. Stelarc takes literally McLuhan's notion that technological media are extensions of the human senses and all his performances demonstrate a perverse insistence on body modification and the redesign of the bodies' architecture, skins and internal body spaces themselves. The body in this conceptual framework, is like the designated and increasingly useless "meat," in cyberpunk fiction after *Neuromancer*, William Gibson's cyber-cowboy protagonists are "jacked into computer generated virtual realities or are technologized with implants, biochip wetware, nerve amplifiers, neural interface plugs and designer drugs. Stelarc's work opens up post-human issues with agency, control, manipulation and appearances. Kathryn Halyes sees Stelarc's work as a concrete realization of the post-human ideas of consented embodiment.

Stelarc's body performances display a utopian evolution that posit the contemporary body both as virtually disabled by the increasing complexity of information/technological support systems and as potentially as evolving into more adaptive interface configurations. The objectification of the body, which underlies all body art, is pushed to an extreme in Stelarc's vision of a mutating somatic and nervous system that can improve if it opens up to cyborg synthesis. The metaphor of the cyborg is actually being performed in Stelarc's performances. "In Stelarc's work, the interface is a kind of negative "dialectic" (realized through electrodes, transducers, muscle stimulators, amplifiers, force-feedback systems and extra limbs) that probe the tension perhaps resistance between the human and machine." [7]

"In cybernetics, the cartesian idea of the body as a machine is merged with conceptions of the body as a self-regulating system. [8] Mechanisms of organisation based on coded messaging and computation are derived from both individuals and groups and these are extended outward into controlling devices and servomechanisms that can be made to simulate and regulate the behaviour of an organism or any complex structure through feedback systems." [8]

Digital/networked stimulation systems to allow for the external and remote manipulation of the objectivised body. The 'movatar' experiment demonstrates the 'involuntary' movements of the body controlled remotely by electrodes attached to the body. I attended a workshop and I had the opportunity to participate at 'transister,' 'robots, motion capture, special effects,' stelarc and louise phillipedemers. In a workshop organized by stelarc attached electrodes to my own body and stimulated these externally, so that I could

experience electrical charges to my body, to feel involuntary movement, to feel my muscles contract and move. No matter how I tried to counter react, with my body, it was impossible and produced the sense of disembodiment, even though i was feeling pain. I was stimulated from out of my body and was not in control. Stelarc's work undermines the conception that one's own body, is moved and activated by consciousness, that the out skin of the body is affected by an external outer consciousness that impacts the body from the outside, a fractal and dispersed body, animated by the forces hidden in the outer body.

In the virtual technologies that stelarc also has experimented with, 'movatar,' stelarc constructed a structure that allowed a body to animate a 3D computer generated virtual body in cyberspace. Markers in the body tracked by cameras are analysed by computer and the motions transferred to a virtual actor. Stelarc's hypothesises a virtual body that can access a physical body, enabling the later to perform in the real world, with newer technology the avatar can then be imbued with artificial intelligence.

Stelarc's art form of adapting the body to technology, demonstrates an art form that questions the evolution of the body and perception alongside advances in technology. It is more than comparative to all the research in new media aesthetics, that the body is affected by technologies. The questions that are raised can also be applied to the physical bodies' importance in interactive art.

VR technologies that are used in new media art are not just developed to increase immersion, which is usually of prime importance, but it is the bodies' interruption that can be explored and what that interruption of the body can realize aesthetically and aesthetics of response.

NEW MEDIA INTERACTIVE TECHNOLOGY

Earlier VR technologies, used body sensors for tracking and for moving through space in VR worlds, adapting the HMVR displays, cave and data gloves. 3D computer graphics, in earlier VR environments, tend to rely on 3D Euclidian geometric models, renaissance perspective and the xyz coordinates of Cartesian space. [9] "While the rest of the body is an imperfect and inconvenient matrix of consciousness that can be externalized as a data space." "The psyche clings to the memory of the real body and its formulations in physical space" P.60. In VR immersive environments, the body is disembodied, but is also partly embodied as the body always clings to the real, but not always? There are unconscious processors below the surface of the skin, which have memory and react in the virtually disembodied environment; standing on a virtual cliff, can have the same effect as the real on the body, this is what is called presence. The most recent development of computer vision, a camera that includes 3D depth vision, is the Kinect Sensor, which I have experimented with in this research. Using the Kinect sensor system and

transforming the data into interactive immersive surround, (rather than the VR system) it is easier to make the experiencer aware of cultural inscriptions, whilst reconfiguring the proprioception. I used the Kinect Sensor with the UNITY 3D game engine, OpenNI/NITE and the Microsoft Kinect, for the final main study after a series of experimental interactive designs. The game engine can handle large amounts of data crushing and is much faster, so has been easier for interactive installations.

Implementing the 3D data, for manipulation of full body joint manipulation of several 3D structures. I have explored Avatar creation and manipulation in numerous software and programming environments. The rendering of live body 3D data and orientation for 3D objects has contributed to further research on 3D manipulation and the Natural User Interface (NUI). There has been some research into the area I have proposed. Such experiments with this have been included, in the Journal of Otolaryngology. [9] This was research on manipulating virtual 3D objects in VR environments and devised series of hand gestures that increased the recipients ability to pick-up virtual 3D objects.

NON-CARTESIAN WORLDS INTERACTIVE DESIGN

A non-Cartesian virtual design was created for the audio-visuals. From the observations of the interactive audio/visual Installation it was decided that the overall non-structure of a non-Cartesian World; 3Dimensional objects, structures, spatial qualities, transparent qualities, needed to be developed in order to surround the recipient in an environment that engages their bodies' movement perception.

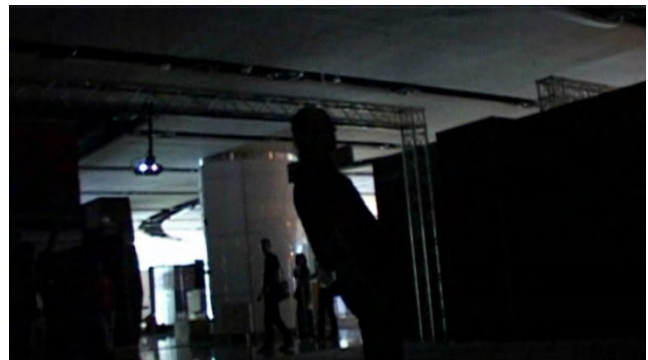


Fig. 1. Body-Motion Interactive Environment, 2012, © Ken Byers.

The concept is to make experiencers more aware of, their bodies embodied inscriptions and to transform these known feelings and experience. In the digital interactive virtual space in order to feedback to the user their habitual embodied body spatial dependency on the environment and also to increase the perception of complex visions, formed by the colliding of the unconscious with the consciousness to induce or release a creative awareness and creative imagination, that is attached to body-memory. The interventions made by the interactive design on the body-movement, flush and de-stabilizes proprioception and reconditions or makes the recipient aware of their movement

in comparison to the virtual environment causing a strange sense of presence. These micro-kinesthetic changes stored in proprioception allow a reflective perception that causes us to reflect on our body sense, in the designed-non-Cartesian-world.

The 'experiencers,' walk into a darkly art space in a gallery setting, with 3 adjacent wall projections and stereo sound (Fig. 2).



Fig. 2. Non-Cartesian Body-Movement Interactive, 2014, © Ken Byers.

If the experiencer stands still no 3D imagery will move or sound created. When the experiencer moves an arm or leg or walks or jumps, the 720° virtual worlds with 3D sound is activated. To direct full attention from the 3D cyborg world view and its parts, parallel attention is brought to body movement and pre formed movement by the displaced images and sound which are incongruent with the last body move. Zooming, increased speed of moving 3D imagery, changes in direction, shader effects and sound displacements, develop a theme for the experiencers (Fig. 3).



Fig. 3. Non-Cartesian, 2011, © Ken Byers.

The Kinect Camera sensor was coded to translate body skeleton movement data into xyz points in space, which were programmed with the Unity3D game engine. Unity 3D was chosen over other games engines because of its scripting API, c# and Java which I am familiar with. Most of the design for the virtual world was done in 3Ds Max and Maya, but the Microsoft Kinect was coded with OpenNI, to translate body-movement data from the skeleton to the Unity API. It was also decided to use Unity over Open Frameworks, Max MSP and Processing, for the 720° world, that

could be easily designed in Unity 3D. In this case the main camera in Unity was connected to the virtual and the physical torso, making it first-person. The recipient could walk around the virtual space. The Unity Game engine with the Kinect sensor allowed me to use OpenNI, follow_transform _scripts, so that I could move structures with 14 body joints and hand gestures. The experiencer could be immersed in an interactive 3D world with sound and could move around in the 720° virtual world, in the 270° physical space, whilst distorting the perspectives of the non-Cartesian structures, scale and viewpoint and navigating to sound hot points.

DISCUSSION AND ANALYSIS

The 'active realization' of body-movement perception, is an alternating or a parallel manifestation of reflective and immersive moments. The interactive design was designed to interrupt the recipients, body-movement perception, by using interactive and audio/visual perception techniques, to unhinge embodied body-memory, 'proprioception.' This was to in an embodied artist's environment, a more creative aesthetic experience is gained. It is known that the body's kinesthetic sense is capable of continually updating in micro-changes and with 'proprioception's' ability to relearn and store this in memory. The interventions made by the interactive design on the body movement, flush and destabilizes proprioception and reconditions or makes the recipient aware of their movement in comparison to the virtual environment causing a strange sense of presence. These micro-kinesthetic changes stored in proprioception allow a reflective perception that causes us to reflect on our body sense, in the designed non-Cartesian world.

The interactive design interventions of body-movement cause the body perception sense, to-relearn or re-form their next movements. This confounds the recipients' body movement and the aesthetic lies between the re-forming and the aesthetic imaginative engagement of the virtual audio-visual.

By enhancing body perception through digital technologies, awareness and consciousness turns to the body itself, as well as feeling to be in control of the media, rather the media controlling the recipient. They have to re-engage their body whilst in motion, which leads to exploring a changing and evolving embodied perception, in real-time. This bodily connection with the virtual then experiences a 'virtualized subjectivity.' [2] It is conjectured that these interactive installation cause the participants aesthetic subjectivity, to continuously reform, through a newly obtained body-memory attained from kinaesthetic memory and 'proprioception,' which is continuously changing and evolving. So by doing this the installations are exploring body-movement perception, an 'embodied movement awareness,' and aesthetic of behaviour. This alters the experiencers' awareness, perception and consciousness towards a more creative response from the individual. This challenges cultural body inscriptions that inform our thought systems and movement and also therefore by

definition embodied perception. The 'active realization' of body-movement perception is an alternating or a parallel manifestation of reflective and immersive moments. Aesthetic distance or reflection is possible and is an essential counterpart for body self-reflection, in the interactive environment. Aesthetic experience of interactive art is especially shaped by the interplay between immersion and distance. For only in this way can one's own actions become available as an object of reflection, in the audio-visual world of the installations. Specifically I wanted to gain a better understanding of body-movement perception, body-perception and consciousness in interactive audio/visual installations and how technology is changing our mind/bodies, affecting the way we perceive. Most media theorists have been concerned with disembodiment associated with cyberspace and virtual Reality, which were not only triggers for theories create a proprioceptive state of mind/body reflection, where 'embodied-movement-creation' can be 'relearned,' with a real-time response to interactive aesthetics of audio and visual media. The interaction with projected 3D structures and parameters of synthesized sound, by body-movements, gestures, pre-formations, of the limbs of the body can be very complex and engaging, causing an aesthetic creation in relation to continuous body-movement. This is the presence of virtual enhancement of the senses, which gives a wider understanding and ambiguous perceptions in the interactive environment. It also gives the recipient an awareness of how their body movement is relearning to interact in a more meaningful way.

By observing our own embodied body-movement, we see a change in perception and consciousness of the virtual audio-visuals which is affected by the interactive body-movement installation? The problem was to discover if by affecting body-movement and turning the body inwards of disembodiment, but also with it a revival of the corporeal – in the form of bodily action in the virtual world. Interactive new media works like these simulate Virtual Reality (VR) technical systems that are linked to participants body movement. Interactive systems create possibilities and new contexts of perception/self-perception. The transformation of physical movement into spatial experiences in the physical space and in the virtual are brought about by information which is translated by the code. This calls into question the boundary between material and immaterial, body and space, between body perception and information flows. The interactive designs' intervention of repeated body movement causes a halting, of the body in motion, in which the recipient is caused to perceive the relationship between the virtual, the data and the body.

Contemporary artists endeavor in their work to uncover, for us to see out of the habitual, day-to-day, culturally inscriptive truths that affect the way we perceive? This practice-led-research has identified several areas within body perception, interactive design and human computer interaction, which needed to be further explored and that informed the interactive design experiments, to develop a theory of body-movement perception and aesthetics.

This was explored in the preliminary experiments that informed the main interactive art installation.

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SENSES AND PLACES MEDIATED BY WATER. CAN WE SENSE KINESTHESIS IN DANCE THROUGH RIPPLES IN A POND?

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ABSTRACT

In on-going work, technology mediated embodiment experiences are induced in distant and local participants through playful interaction in live performance environments. Simple technologies have been used to sense and share movement and body data. Mediated through 3D virtual world technology a digital space synchronously creates shared presence at a distance, using both the shared data sources and video streaming. The collection and recognition of data used to create the feedback is through a computing system tailored for the particular performance space. Here we consider the practical application of literal liquid state machines in the form of small bodies of water to enhance pattern recognition that triggers feedback, with the intention that the systems automatically adapt to new performance spaces.

INTRODUCTION AND CONTEXT

Performers and invited audience participants in remote locations meet and playfully engage kinesthetic/synesthetically with one another and a 3D virtual world environment through an ongoing dance-technology collaboration that takes a generative cross-cultural somatic approach. This reflects Thomas Hanna's 'somatic body (r)evolution', in which he presents an optimistic vision for human evolution in the passage to the twenty-first century, by countering technological dominance with a childish, playful somatization of technology. [1] A similar ambition for the system is a form of implementation of Susan Foster's concept 'choreographing empathy' in which participants become embodied by being 'similarly hooked into environments both immediate and distant, this body draws upon a 'cyber-kinesthesia' to rehearse options for making its way in the world.' [2]

Katherine Hayles' 'posthuman embodiment' perspective is taken. [3] Hayles presents thought as a broad cognitive function that has characteristics depending on the embodied form acting on it. In this way she reclaims the 'post human' from cybernetics' liberal humanism, in which thought is considered independent and transferable like a ghost in the machine. This gap between human and machine virtualizations are collapsed through Lévy's concept of 'humanization as a process of virtualization' removes a similar gap between human and machine virtualizations. [4] The present development therefore sits within a larger philosophical scope in which body and virtuality are characteristically human.

After experiencing the first use of drawing in a digital medium with SketchPAD Ivan Sutherland's team can be paraphrased, saying they did not know they could draw in this way until they tried the system they had just built. [6] While in one sense they could have been expressing the joy every child can express when first drawing a line with paint-dipped fingers or colorful chalk,

something profoundly different seems to have happened. Having developed a computer system for enhanced drawing, they facilitated the capacity to draw and redraw; adjusting and refactoring engineering style drawings with greatest ease. Where, previously, drawing required: rulers, protractors, calipers and careful marks, with complete redrawing or careful erasing to make adjustment, suddenly, humans had the capacity to directly manipulate drawings which could be pulled and stretched, dragged and instantly adjusted; the system provided immediate feedback allowing reflection and adjustment and resolution of the drawing through a far more direct extension of the human into the domain of the drawing. [5]

This is perceived, in this project, as a form of embodiment that has post-human characteristics; digital technical drawing was not able to be, until embodied by this new 'man-machine communication' form. Taking a post-human perspective, collaborative environments that use simple techniques to enable playful engagement in kinesthetic/synthetically are being developed. These have been deployed in performance spaces. Over time the goal is for these environments to be open for continuous public participation. Hence, through multi-modal interaction this project considers what emerging embodied realities and culturally-specific exchanges surface through the performers and participants' involvement with their own and each other's physical bodies, video mediations, 3D virtual world avatar moves and/or bio-environmental changes.

DEVELOPING FOR EXPERIENCES THROUGH DESIGN

Tools for enabling these experiences have been developed and grown over a number of years. First a wireless heart rate and body temperature sensor system was developed. Biometric data is mapped to a local display, providing feedback to the performer of internal body state. In a second phase, pre-recorded motion captured from performers was translated into a form that could be used to animate an avatar in a game-like 3D virtual world platform. The process of translation distorted the animations. During the captures, performers were also quite challenged as they needed to relate to emerging dismemberment and deformations of the character's body and movements caused by the involuntary obstruction of the sensor spheres attached to their joints. This became a key, though unfamiliar, somatic component (Fig. 1). A hand-held controller interface was developed that allows adjustment of the point of view in the 3D virtual world as a dancer interacts with the avatars and the digital space.

The sense of presence in the 3D virtual world was enhanced by a web camera interface that integrates participants' movement to actuate animations of their avatar in the 3D virtual world (Fig. 2).

During performances data was queued and transmitted into the performance space, controlling colored lights and a smoke machine, while simultaneously causing effects in the 3D virtual environment (Fig. 3). In an additional mode video streams were captured at different simultaneous sites and streamed into the shared 3D virtual world, while participants engaged with live video projection of the virtual space (Fig. 4)



Fig. 1. Screen shot of deformation from motion captured session with two dancers.

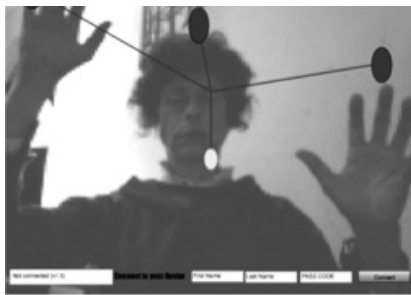


Fig. 2. Web camera interface actuating distorted movement in avatars.

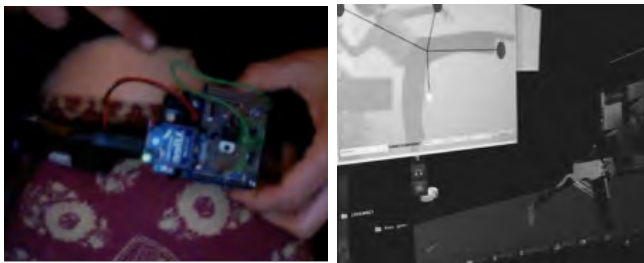


Fig. 3. Web camera interface actuating distorted movement in avatars.



Fig. 4. Performance streams from three physical sites of practice, from within the virtual world.

Can we sense kinesthesia in dance through ripples in a pond? Following the previous modes we consider how we might sense kinaesthesia and integrate that sensing back in the accumulated experiences within the context of potential post human embodiments. Our thinking about kinaesthesia starts from a dance perspective by considering a person's sense of themselves in space, location and in relation to others as they go about daily activities. Kinesthesia is extended to a person's body or presence expressed in media, including both dynamic media such as presence in 3D virtual worlds and in terms of the artifacts they produce and manipulate.

Ways to sense people and places are in two broad categories: attaching sensors to the subject or through remote sensing. In both cases the data collected is subject to variation in conditions that are inherent in human movement and expression and the environments through which we move. For example, humidity effects galvanic readings, a person's body temperature range may change from hour to hour that being effected by the work they are doing, their natural cycles and the external environment. Hence we considered potential smart ways to deal with this variation. That led to exploring the potential of simple algorithmic systems that have the capacity to produce consistent results when the sampled data can undertake variation through pattern recognition. Once such system is the "perceptron algorithm" described by Frank Rosenblatt in 1957, a simple form of simulated neuron as cited by many, for example Ibraheem Al-Dhamari. [7] Such systems produce consistent results, however there is still a rigidity in them. Much later research has been working on recurrent networks that provide a context based on the current situation and historical situations, the liquid state machine (LSM) described in [8] is such a system. The behavior of the LSM is similar to water – having a large number of self-regulating and self-referencing, recurrently propagated and self-learned information. Since programming an LSM can potentially be computationally high and because water appears to behave like an LSM, Chrisantha Fernando and Sampsa Sojakka produced a pattern recognition system that included a bucket of water as a preprocessor for an array of perceptrons. The system was then trained to recognize spoken words. [8] When the water was included in the system the rate of successful recognition went from 60% to 80%.

We propose to reproduce the "pattern recognition in a bucket" experiment for sensed data, where pools of water provide a way to sense place allowing for contextual information to be integrated into the sensing of data from people and locations. A current and proposed embodied experience environment is depicted in figure 5. In the proposed system water or simulated water is used as a preprocessor for a system trained for a sensing a range of data. "Simulated water" is treated as a form a Monte Carlo approach allowing for a LSM effect using graphical animation software developed to give the appearance of water. In figure 6 we represent the simulated water as a kitten,

acknowledging Sergey Chikuyonok's implementation of Neil Wallis' system. The simulated water can be integrated into all existing systems. [9], Figure 7 depicts water as a direct sensor as an LSM equivalent, to produce a contextualized sensing system for movement into perceptron arrays trained to sense kinaesthesia. The ripples on the water are imaged following the approach taken in, effectively producing an image of an interference-like pattern. [8] The best way to train these open water pools is yet to be determined. We have a set of standard movements that we propose a dancer use as a starting point. However, it has been pointed out that a system that allows everyday people to train the system may produce more normative results.

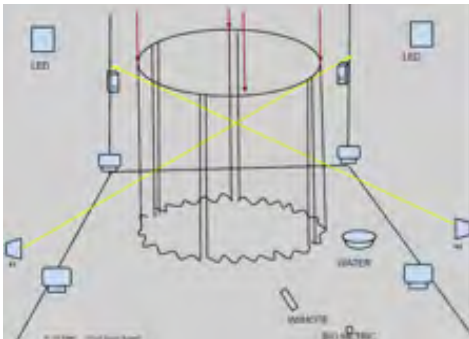


Fig. 5. A current environment and a depiction of a proposed embodied experience environment.



Fig. 6. Integrating simulated water with existing systems.

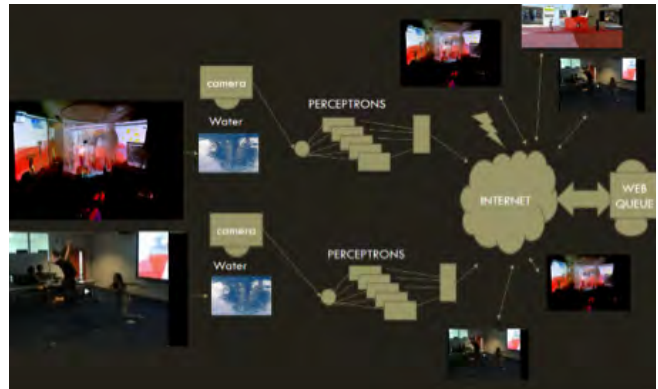


Fig. 7. Physical water as a direct sensing as LSM equivalent.

SUMMARY AND CONCLUSION

Choreographed to encourage physical and perceptive awareness while interacting with other participants playing with avatars, these Senses Places environments aim to allow participants to engage with one or more interfaces at a time depending on their experience with game gadgets and mediation in general, as well as subjective factors. Thus, the physical-virtual convergence of bodies/senses and places is activated and altered by the participants' engagement through a combination of the interface systems. Meeting remotely to perform together in a more in-depth relationship with/through the interfaces, participants elaborate scores or structured improvisations, attuning with one another's images and/or avatars, places and times and emphasizing visual-somatic poetics.

Following and responding to each other's physicality, virtualities and environments, the performers' playful deconstructive dance is mediated from each node, also serving as an instigator and facilitator of physical and/or virtual audience participation, thereby enhancing opportunities to experience post human corporeality. Through these processes and their development we explore and develop systems that sense body movement and continue to pioneer ways to enhance our understanding of kinaesthetic sensing.

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TELEMATIC INTERACTION IN CREATIVE COLLABORATIVE ENVIRONMENTS

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ABSTRACT

Through this paper, which gives advances on the doctoral research “Configuring Active Tele Spaces – Performative distributive Interaction Environments of Audio & Visual Creation –” it is intended to clarify some of the questions and understand turning points that occur to crosslink art, design and technology, with elements (media) visual, acoustic, sound, spatial and object-based, mixed in the same space-time frame supported by compatible technologies and telematics telepresence based on the perspective of interaction design.

It is proposed how the interaction model changes or consolidates, according to relationship processes and interaction between intelligent agents supported by the “Active Spaces” generated by telematics networks and how they are reconfigured as media and space allowing the design of new metaphors like the assembly or group that enhance the possibility of collective creation and ubiquitous presence, proposing communication structures based on gesture, presence and body language. [1]

BASED APPROACHES

In the last decade different paradigms attempt to explain the relationship between humans and machines, in this analysis there are studies that relate men and computer interfaces in HCI (Human Computer Interaction). This way there is set an analysis that focus on: technological developments, as models like GRID or Streaming in the design or the natural interaction and emotional design and art such as net art or collective art, to mention only some of the proposed positions from different areas or disciplines. While technological advances influence the way we interact with it, they also depend on how we take them and how we understand and use its features. The aim of this paper is to address some of these questions and understand turning points that occur to crosslink the creative and design fields with the technology and those with visual, acoustic, sound, spatial and object-based elements mixed in one space-frame supported by a temporary-space and telematics and telepresence technologies. All of this from the perspective of interaction design. This can be achieved thanks to the opportunities provided by telematics networking.

Thus analyzed from technological and multimodal interfaces from interaction design telematics looking to find elements that link the relations given in HCI type models in networks that pose forms of communication and creation, also, varying models for collaborative work, such as the ubiquitous computing posed by Poslad Stefan who introduced the concept of the invisible, where technology such as computer and other technological devices are incorporated as part of the environment that are perceived and naturally moving the space and the concept of telepresence. [2] Also proposals as multimodal interfaces, which seek interaction with systems that do not require specific skills and

become more effective and natural as the voice, gestures and other human expressions. [3]

TELEMATICS CREATION

When we approach characteristics such as latency, certain questions arise. One of which is, how to achieve a threshold of 20 minutes delay in distributed performance over Internet networks? Actually, a question of this nature is obviously framed in the space of engineering and technology, but its importance in the field of design and art is far from irrelevant. Achievements and performance of distributed events have already been implemented in different types of creative fields (dance, theater, music), but what exactly has been done? Are they merely technological experiments? Are expressions of design and art with its own aesthetic and / or creative constitution? What is the future and possible new proposals in this field? What contributes to other fields of digital development? These are very important questions in the approach of the analysis process design and implementation of a distributed collaborative activity type, because there is considerable difference between an experiment for purely scientific purposes to a creative order experience or activity in the workplace by mention just a few areas in which these types of activities can occur.

The reconfiguration of the roles of users and creators (performers and audience) in this class of models suggests that, perhaps, experience and emotion are elements that must be considered, even surpassing the communication model (such as cognitive models or user-centric, for example) or the structure of the interface itself. This is perhaps natural when we face a new type of format, which generates expectations and challenges from a creative standpoint and design, such as new forms and expressions has occurred in the past have emerged. There is no doubt that people who work with performance distributed (especially from the creative side and why not say, artistic) must hold as their ultimate goal that these formats are accepted as valid in the creative field and academia, not just a curiosity or a simple technology demonstration, as within films. This can be done when the technology is appropriate enough in the fields and contexts of creation itself and it is understood that some of the technological knowledge must be active, compositional and structural part in the creative process; also that technological developments are required and must be seen beyond a simple step, but without forgetting that they express the desire to create and communicate; which is the final and ultimate purpose in this type of process.

One element of great importance and that should be considered is that of preexisting forms of expression versus creative ways, created specifically for this format. One of the main topics (from a creative point of view and experience) refers to the attempt to

use the traditional formats using new technologies, such as the creation of distributed performance in classical music (in context strict) technology being used here only as a means of transport, compared to experiences of creating experimental music composition on models involving distribution and latency as one of the elements in the score, composition and creation itself. This paper seeks to clarify some of the questions and submit questions and propose some elements that relate the topic of collaborative creation of shared spaces – summarized in the term of telematics creation-, this way the beginnings and creative context led to the development of distributed performance, from a perspective of audiovisual creation and collaborative design. Some of the terms that are used in this field in order to understand their meaning, are defined, at least from a creative point of view. Once these concepts are understood, a definition of distributed performance and active spaces arises. This is understood as a disciplinary field and construction of telematics creations. Finally, some elements are formulated in order to structure a new telematics proposal, based on concepts such as presence, motion and hearing, framed in the discipline of interaction design.

DISTRIBUTED PERFORMANCE & ACTIVE SPACES

Trying to understand the performance in terms of distributed performance multisite network may be, at first, confusing to understand; however, it is not so confusing. This could be summarized as two or more performers in separate locations performing work together simultaneously. The concept is very simple. Furthermore distribution and networks are familiar terms to most people, performance is too or at least should be clarified through the reading of this document. There would be problems if they were to combine these terms in the same concept. The concept can be integrated by saying that the performance networking is a synchronous communication approach, ie, a shared activity between two or more people who are working at the same time.

These partners may be located in the same place or in different places, using remote communication systems such as video conference; allowing people in different locations can see and hear each other simultaneously. This is achieved technologically speaking with a multipoint communication method. The basic system consists of computer, monitor, video camera, microphone and speakers in every room. What have to do distributed networks with creation and design? Is that about talking about tours where artists travel and repeat the “same” performance in different places? Does it speak of events as the “Met Live” where opera productions are broadcast around the world, live and concentrated audiences in theaters? As mentioned above, the definition for distributed performance is not very hard to give. The concept of two or more interpreters who are in two or more places. However, this is possible, thanks to high-speed Internet and advanced software (and hardware) that allows the implementation and proposal, where creators, performers and participants (public) are geographically distant but connected electronically.

Basically, a network performance serves to expand global environment creating an “active space” made by the artists and the venue for the participants and the audience. Active space is Initiated by the computer video artist John Crawford, who refers to the computer environment as “a space where interaction and collaboration between people and machines.” [4] Crawford develops and participates in a series of workshops and performances where dancers, actors and musicians interact with machines to explore their creative uses in live and interactive performance to analyze the direct participation in an environment of active space facilities. Crawford presents a structure where individuals have opportunities to collaborate and take responsibility for their own work within a performance while connected to a larger environment where other stakeholders are working on the same project, thus are created text and images that are developed parallel from a generally structured improvisation or choreography. This makes it possible to structure a media that reflect the aesthetic sensibilities of creators and artists. In an article entitled, “Aesthetics of Telecommunications” Eduardo Kac suggests that technologies and applications for online collaborative performance (on line) can be characterized as: Employing computers, video modems and others devices-using visuals as part of a much larger interactive, bi-directional communication context. Images and graphics are created not simply to be transmitted by an artist from one point to another, but to spark multidirectional visual dialogue with other artists and participants in remote locations. This visual dialogue assumes that images will be changed and transformed throughout the process as much as speech gets interrupted, complemented, altered and reconfigured in a spontaneous face-to-face conversation. Once an event is over, images and graphics stand not as the “result,” but as documentation of the process of visual dialogue promoted by the participants. [5]

Kac’s comment implies a kind of structured improvisation, which is seen as an interactive process between man and machine. Kac also exposed how more and more people worldwide are interested in sharing visual images and information, this thanks to technologically equipped video conferencing systems that are becoming more common as well thus allowing the creation of more and more environments of active space, of course not forgetting the improved models of telecommunications.

Internet 2 is the next generation Internet, the network provides advanced capabilities for high-speed transmission of moving images and sound. This new version of the Internet is beginning to accelerate research and creative activity of associations of creators, artists and groups of researchers. The hardware components required for a performance on Internet 2, are communications equipment, such as audio processing hardware and video routers and access points. In some of the earliest examples of performance using Internet 2 where visual and sound elements (such as music, theater and dance) is “technophobe and the Madman” where artists and researchers from New York University and Rensselaer Polytechnic Institute collaborated

through 160 miles between Troy and Manhattan in New York. the project culminated in a performance on February 20, 2001. [6] In the same year, on November 29th, a historic performance of Internet 2 was conducted by the University of California, Irvine and New York University. Its name was *Songs of Sorrow, Songs of Hope*. This multimedia show was created by John Crawford in response to the terrorist attacks of September 11 and subsequent events. [7] “Telematic Music: Six Perspectives” covers the history, context, technical description and artistic network that the authors (Pauline Oliveros, Sarah Weaver, Mark Dresser, Jefferson Pitcher, Jonas Braasch and Chris Chafe) performed together on 16 November 2007. [8] The authors participated in the concert simultaneously and interactively, with high quality features of audio and video and low latency using Internet 2 and JackTrip software developed by Chris Chafe and ICHATv Apple. In this performance distributed, Rensselaer Polytechnic Institute in Troy, New York, Stanford University in Palo Alto, California and the University of California, San Diego in La Jolla, were together.

A LITTLE HISTORY

The network performance has a history that is probably more extensive than most people can imagine. Both creators like musicians and filmmakers and videographers in general have always been fascinated by the creative collaboration across distances. That may probably be the first performance distributed event that took place in the US in 1891. The Boston Evening Record. “The operator at Providence plays banjo, Worcester operator harmonica and others sing softly. Anyone can tune to initialize the music and singing. To see the effect, you must have a transmitter close to your ear. The music sounds as clear as if you were in the same room.” The “others” were telephone operators in Fall River, Boston, Springfield and New York. [9]

Long before the dawn of the Internet, the composer John Cage created what is considered one of the first performance distributed in “Imaginary Landscape No. 4 for twelve spokes.” (1951) Where used as instruments transistor radio. These were interconnected and influencing each other. Although levels of interactivity were limited to dial the radio station, the gain and tone (EQ) and the desire to investigate the possibilities of cross-influence in networked instruments is evident in the work. This of course is far from the current distributed performances, but it illustrates the creative drive to explore the potential of the “new” technology and new possible formats for audio visual creative expression. It was not until the development of computers, a more direct, thanks to the Internet and data networks, interaction became more affordable as possible because you can easily transport data from one point to another. “One of the first groups in the practice of experience in network computer equipment was the League of Automatic Music Composers in the late seventies.” This group (later renamed The Hub) experimented with remote collaboration between the East and West coasts of the US Due to the limited bandwidth available at the time, the group exchanged messages and no audio or video signals. [10]

APPROACH TO THE ACTIVE SPACES

Since the beginning of the twenty-first century, specifically in the second decade, we are living and with widespread institutional access to high-speed networks (Internet 2), artists and researchers have begun to explore the concepts about creative telematics much more frequently. This has led to a lot of examples that include all disciplines related to the visual and sound creations, which develop various types of performance that extend the possibilities of concepts related to distributed networking spaces. The work and performance established in the domain of distributed networks can be, according to Alvaro Barbosa, categorized into two different approaches: one focusing on computers and network topologies, trying to use them as tools for sound and visual creation and the other focuses on communication aspects and the ability that the networks have to unite people through great physical and temporal distances. [11], [12] Of course, as with all categorizations, in many cases some examples cover both aspects, such as the work of Weinberg and The Hub, as discussed above. [13] However, the application of computers as tools and work generators opposed to the use of technologies as elements that facilitate communication, are the two tracks that are clearly distinguished in the development of distributed performance.



Fig. 1. Tele-active spaces.

From the relations and inflections found, doctoral research has proposed the development of telematic performances that and explores the concepts raised in order to assess and validate the various models of collaborative structures and creation of real-time network, allowing not only new approach types of interfaces and interaction, but also exploring our own approaches or the application thereof to our Colombian and Latin American context. For this, we intend the implementation of applications on networks, proposed such as streaming services and the development of physical computing contemplating the use of sensors, computer vision characteristics, synthesis sound and environments including three-dimensional representation. The project has raised the development of models based on analysis of telematics type and

their evaluation, thus strengthening expertise in telematics development, collective sound and visual creation and design of interfaces and interaction works, allowing to define how to configure telematics based works and propose work structures of collaborative creation as means to make easier the work and build bridges between the various creative and technology disciplines that can also structure the design of performative network environments making use of audio-visual-haptic collaborative network elements, defined here under the term tele-active spaces (Fig. 1).

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THE NEW MEDIA AS TECHNOLOGIES OF SELF OR 'THE SENTIMENTAL JOURNEY' OF MODERN NOMADS

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ABSTRACT

The paper presents different examples of sentimental journeys starting from the legendary journey of Laurence Sterne to the Akademik Shokalskiy ship stuck in the Antarctic ice as an argument for introduction of the term 'Technologies of Self' as a useful tool to describe the ways people cope with unfamiliar circumstances. Just as Phatic communication describes non-informational exchange as a tool of contact establishment with others, the term 'Technologies of Self' helps understand audience behavior in the interactive environment as a tool of self-mastery via reflection.

INTRODUCTION

Acoustic Images Laboratory

The main goal of our laboratory is to research diverse aspects of human – machine interaction in the arts field. For example, interactive audio-visual installation "Acoustic Images" is about interdependence of audience's movements, sound and video. Every viewer becomes a co-author, a conductor and a performer, who adds her own music part to the sounding composition. A camera captures movements of the audience and transforms them into sound. Different motions produce different pitches, timbers and volumes and panoramic position of sound. At the same time the resulting music produces video images. Thus the audience can simultaneously see and hear results of their motions.

Importantly, the resulting sound is harmonized so that it does not produce cacophony but meaningful music. It is a "concert sculpture" where a full-length 40-minute 4 parts concert can be performed solely by the audience. Originally we expected participants to enjoy the power of being able to control the process of music production. To our surprise, instead the participants preferred to enjoy themselves, their bodies and reflections of the bodies on the screen, rather than to control the results and were not taken aback by the cacophony produced. They did not want to eliminate the cacophony by creating harmonious sounds. Instead they enjoyed the very act of the interaction. That made us re-evaluate the very meaning, *raison-d'être* of the interactive arts. So, when dealing with audiences of our Acoustic Images installation, I ended up watching other people watching our installation and artworks in general. I've noticed how introvert people in fact seem to be while looking at objects and even while interacting with them!

The Mechanism of Catharsis

Until recently, Lev Vygotsky's theory of catharsis was used to describe the mechanism behind the emotional response of the arts' audiences: "Catharsis of the aesthetic response is the transformation of affects, the explosive response which culminates in the discharge of emotions.[...] the basic aesthetic response consists of affect caused by art, affect experienced by us as if it were real, but which finds its release in the activity of imagination provoked by a work of art. This central release delays and inhibits

the external motor aspect of affect and we think we are experiencing only illusory feelings. Art is based upon the union of feeling and imagination. Another peculiarity of art is that, while it generates in us opposing affects, it delays [...] the motor expression of emotions and, by making opposite impulses collide, it [...] initiates an explosive discharge of nervous energy." [1] In other words, Vygotsky implies that all our feelings necessarily come with bodily motor discharge. In the situation of art's consumption (at a theatre, art gallery or other cultural setting) the external motor discharge is impossible. Thus the affect caused by art finds release in our emotions. This intensification of emotions caused by absence of motor discharge results in the catharsis. [2]

Moreover, for this aesthetical catharsis to become meaningful for the audience it is necessary that the audience remain at a distance from the art work – both at a physical distance and a psychological one. We immediately notice here that this analysis of the aesthetic response differs from our research interest – interactive arts – in three important ways: 1) it stresses the importance of distance between the audience and the art work; 2) it underscores the absence of motor discharge and 3) it describes response of the audience to the familiar. The audience dives into catharsis because it recognizes the circumstances presented in the artwork (in Vygotsky, mostly theatrical works).

In interactive environments, to the contrary, the audience 1) is physically immersed into the artwork, 2) most of the time invited to respond with bodily movements and 3) the circumstances offered by the artists are often not familiar. The interactive arts audience often find themselves in unfamiliar circumstances.

So how do we describe emotional response of the audiences in interactive environments? Would be the term 'catharsis' still useful or shall we replace it with a more apt notion? I suggest widening our research by including social media and interactive gadgets. They all can be described as interactive environments. Studying audience behavior in some types of these environments can help us understand better the audience behavior in other types. Let us start with the emotional distance and its role in cultural studies.

REFLECTION

In cultural studies, emotional distance was often connected to the notion of reflection. Indeed, to be able to reflect on something one has to be detached, disconnected from it.

But this disconnectedness can be of two types. The first type was invented by the Enlightenment via invention of the Public Sphere – a sphere where public affairs would be discussed outside of political action, using purely rational tools, most important of which was a disinterested reflection. Some hundred years later Søren

Kierkegaard described the Public Sphere as a new and dangerous cultural phenomenon in which the leveling produced by the Press brought out something that was deeply wrong from the start with Enlightenment idea of detached reflection.

The press leads the public to transcend their local, personal involvement and overcome their reticence about what did not directly concern them: “a public [...] destroys everything that is relative, concrete and particular in life.” [3] What is lost in disengaged discussion is precisely the conditions for acquiring practical wisdom. The only alternative Kierkegaard saw to this paralyzing reflection was to plunge into some kind of activity – any activity – as long as one threw oneself into it with passionate involvement. [4] Another alternative though was offered inside the Enlightenment and in the same time period and it was the other type of detached reflection: reflection of a Sentimental poet, not a public.

SENTIMENTALISM

Definition

Friedrich Schiller, one of the most prominent figures of the proto-romantic movement Sturm und Drang, counts reflection as the main difference between a naïve poet and a sentimental one: ‘All poets belong either to the naïve or to the sentimental. [...] The sentimental poet reflects on the impression the objects make in him and only on this reflection is the emotion grounded, in which he himself is moved and moves us. The object is here connected with an idea and only in this connection does his poetical force rest. The sentimental poet is therefore always concerned with two conflicting conceptions and feelings, with reality as limit and with his idea as the infinite and the mixed feeling he arouses will always testify to this two-fold source.’ [5]

Christian Scheib explains:

‘According to Schiller, then, those who believe in the immediate are naïve, while those who desirously and reflectively continue to productively work on transference [...] are sentimental [...] This reflectiveness or, to [...] express it more in terms of von Foerster’s Cybernetics – this constant feedback, is connected to the original existence, the already-having-been-createdness of images.’ [6]

The literary movement Sentimentalism has appeared as a reply to Enlightenment’s over-reliance on reason (Rationalism) while demonstrating how emotions are to be constantly analyzed, reflected upon in the form of sentiments. Contrary to the one just described in the previous chapter, the sort of reflection proposed by Sentimentalism seems to offer an alternative, a solution to the problem discerned by Kierkegaard in the disengaged reflection of the Public.

Laurence Sterne was the contemporary of the Enlightenment. This means that he could not envision the troubles observed by Kierkegaard. Nonetheless Sterne’s ideas are valuable precisely because they cast an alternative light on the issues concerning the Self and the Public in the age of Reason.

Laurence Sterne

Sentimentalism attained its ultimate form in the works of Laurence Sterne whose unfinished novel ‘The Sentimental Journey Through France and Italy’ (1768) gave the sentimentalist movement its name. Unlike prior travel accounts which stressed classical learning and objective non-personal points of view, ‘The Sentimental Journey’ emphasized the subjective discussions of personal taste and sentiments, of manners and morals over classical learning. Though the novel was supposed to recount a journey, like most sentimental novels it had a plot which prioritizes advance of emotions over action. Thus though the hero travels from one geographical point to another, his main journey is from one emotion to another. So it is a sort of a non-journey.

A little accident described in the chapter called ‘The Remise Door. Calais’ seems to demonstrate the mechanics of sentimental reflection: “Monsieur Dessein left us together, with her hand in mine and with our faces turned towards the door of the Remise and said he would be back in five minutes. Now a colloquy of five minutes, in such a situation, is worth one of as many ages, with your faces turned towards the street. In the latter case, ‘t is drawn from the objects and occurrences without – when your eyes are fixed upon a dead blank – you draw purely from yourselves.” [7]

A man staring at a dull meaningless object, having to extract the meaning from himself – that is a portrait of the modern man in front of the TV set or a computer screen! The sentimental plot structure is even more visible in Sterne’s other novel – “The Life and Opinions of Tristram Shandy, Gentleman.” The development of ‘Tristram Shandy’ is nearly static: by the end of nearly 400 pages Tristram has hardly arrived to the age of three and only due to the little accidents involving Tristram and his family does the story develop and retain some kind of narrative coherence.

In the light of the previous discussion we can say that two Shandy brothers represent two types of reflection: disengaged, knowledgeable, well-read Walter and sentimental, emotional, engaged Toby. Clearly, Sterne’s sympathy is on the Toby’s side. On every occasion, Walter has a quote from Classics, while Toby measures everything by his moral values. Thus in Schiller terms, it is Toby for whom “reality is limit and his idea is the infinite,” making him a perfect sentimental poet though he never wrote a line of rhymes. In “Tristram Shandy” too Sterne narrates a kind of a non-journey (in fact, a non-journey as a narration of a voyage inside the bigger non-journey of the novel itself). With his famous sense of humor he calls it ‘my plain stories’ hinting at a nearly static pace of his novel: stories are as devoid of interesting adventures as plains lack interesting geographic features.

“How far my pen has been fatigued, like those of other travelers, in this journey of it, over so barren a track – the world must judge – but the traces of it, which are now all set o’ vibrating together this moment, tell me ‘tis the most fruitful and busy period of my life; [...] by stopping and talking to every soul I met, who was not

in a full trot – joining all parties before me – waiting for every soul behind – hailing all those who were coming through cross-roads – arresting all kinds of beggars, pilgrims, fiddlers, friars [...] In short, by seizing every handle, of what size or shape soever, which chance held out to me in this journey – I turned my plain into a city.” [8]

MODERN NON-JOURNEYS

These non-journeys of Sterne came to my mind when I encountered accounts of two modern journeys, more precisely two expeditions. They were different in every possible way: one was undertaken by artists (narrated by the sound artist Hildegard Westercamp), the other one - by scientists (narrated mostly by the scientist Chris Turney), one was an expedition to a remote desert, the other one – to the even more remote Antarctic.

The Antarctic Expedition

The Antarctic expedition was halted when the ship Akademik Shokalskiy stranded in Antarctic ice over last Christmas. The passengers, most of whom were climate scientists, had to interrupt their research. Stuck in the middle of nowhere, amid quite hazardous conditions what did these people do? Naturally enough, they searched for means to keep them busy. Amazingly though, one of the main such means turned out to be [...] blogging. They explicitly announced that they were starting a collective blog ‘to keep the spirits up.’ Or, as one journalist put it, they ‘channeled their energies into video making.’ [9]

The blogging took shape of both writing on the website and video making, apart from social media updates by Chris Turney and other leaders of the expedition. One note on the website is particularly outstanding. It is written by Ziggy Marzinelli and it starts as follows: ‘Hi all. I have never written a blog before and I really don’t know what they are supposed to be about, so I’m just going to write about whatever comes to mind at this very moment – the only thing I can guarantee is that most of it will make no sense.’ [10] Another entry is dedicated to a birthday celebrated on the stuck ship by another expedition member. A few entries are about the Christmas and New Year celebrations. In other words, non-sensational and quite routine occasions. Thus, what happened and what is well documented in the blogs and numerous interviews, explorers-extroverts became introverts, exploration of outer space turned into exploration of inner space; expansion of the physical outreach turned into intensification of emotions.

The Mexican Desert Expedition

A similar occasion happened to the famous sound artist and acoustic ecologist Hildegard Westercamp in a Mexican desert. She wrote: “I experienced 3 weeks of truly extraordinary quiet, as I camped with a group of artists in a Mexican desert called the Zone of Silence [...] I discovered that the sparseness of sound and music in this environment and over such a long time span created a natural desire for sound, soundmaking and listening in

us. Our ears tended to reach out, searching actively for anything audible in the environment.

[...] Our own sounds of walking, breathing and talking were usually the loudest in this quiet place and told us, via the feedback process, where and who we were [...] eventually transmitting a sense of safety and belonging to us. Since we were without any possibilities of listening to music we eventually also felt an acute desire for musical explorations, singing and soundmaking with whatever materials the environment provided us.” [11]

A slightly different situation and not only due to the obvious difference in circumstances of a Mexican desert versus ices of Antarctica. Westercamp describes a hunger for electric devices which they had to replace with instruments of their own making, while on Shokalsky it was the way around: the devices made up for the lack of human interaction. What unites both expeditions though is that they both resulted in their participants being more engaged, as well as more attuned to their relationship with the surrounding environments but also their relationship with their own feelings and emotions, “who we were,” as Westercamp put it. Juxtaposition of these two expeditions is also illustrative of the role which the new media play in our daily goings: these media were used as tools for emotional survival via reflection. With the help of recording devices and/or social media people produced a kind of counter-narrative to screen the unfamiliar uncomfortable circumstances.

We can see also that, just like in Sentimental novels of the 18th century, when people stop traveling, i.e. moving physically, they immediately start moving along their sentiments. Discovery turns into self-discovery or rather self-mastery. Awareness of the surroundings (originally searched for by Westercamp) turned into increased and more attuned self-awareness.

Making as a Feedback Tool

What we see in both expeditions is that people have found themselves in extreme circumstances. Quite unconsciously to themselves they started producing some sort of manipulations in order to resist these circumstances. Note how in the first expedition people turned to video-making while in the second expedition - to sound-making. In both cases it is a making of one sort or another.

Presumably, in extreme circumstances (when they are not a matter of life and death) people naturally turn to the manipulations they grew to be most comfortable with. So what do we see in both of these expeditions? – People turn to the new media. Interestingly, they do not expect the media to entertain them (not in a direct straightforward way) but rather they use them as instruments for dealing with their own sentiments. Perhaps we can call them reflection, ‘feedback’ tools. These ‘tools’ are very similar to what the French philosopher Michel Foucault described as “Technologies of Self.”

“TECHNOLOGIES OF SELF”

The notion of “Technologies of Self” was introduced by the French philosopher Michel Foucault to describe a process of subjectivation, “thought-through and intentional acts, with the help of which people not only establish particular rules of conduct, but also intend to transform themselves, to become different in their singular being, to make their life their own artwork” as a part of a more widely understood ‘Care of the Self.’ [12] [Note: “Technologies of Self,” “Technologies of the Self” and even “Techniques of the Self” all co-exist in the philosophical literature. “Technologies of Self” was recently proved to have the closest meaning to what Michael Foucault himself implied in the notion.]

Feedback as a Skill

In *The Care of the Self*, Foucault describes these practices of self-mastery by means of which the Greek individual sought to transform himself. The goal of such care was to work upon oneself so as to produce one’s life as a work of art, not to find a deep inner truth: “A self that is work of art will not be a lucid subject, an autonomous agent, nor a locus of deep self-analysis, but it presumably will have its own kind of relative unity and stability. And it will be based on taking over these old Socratic-Stoic practices.” [13]

The aim of these exercises is to internalize the learned ‘true speeches’ so that to develop useful skills. Skills are considered similar to the arms for future battles, as a ‘shield’ – Paraskeue.

The same aim is served by Hypomnemata – collections of bits and pieces of learned knowledge, quotes etc. They too are supposed to serve as weapons, useful tools, as long as they are always ready for use. All these skills, “Technologies of Self”, should serve for the development of a form of behavior rather than a volume of learned knowledge. The knowledge must transform into particular standard of behavior.

The aim of “Technologies of Self” is to free oneself, to get oneself towards one’s own relevant nature, which never had a chance to reveal itself before. [14] Ideally, the person is expected to reach a high degree of self-control. To be stronger than oneself means to be always vigilant, to keep oneself always under suspicion. The flux of representations and ideas also needs to be controlled and mastered. Kierkegaard insists that the self requires not “variableness and brilliancy” but “firmness, balance and steadiness.” [15] Without some way of telling the relevant from the irrelevant and the significance from the insignificant everything becomes equally interesting and equally boring. [4] “Technologies of Self” teach how to do exactly that: to tell the relevant from the irrelevant because the Self is expected to constantly filter all incoming representations in order to block those which are irrelevant or out of control of the person.

The Other in the Exercises

The care of self in its core presumes existence of the Other.

Foucault represents it, in fact, as a social practice, inscribed into institutional frames. Care of the self thus is permeated with the presence of the Other: the other as a mentor of life, as a mail correspondent, by whom you measure yourself, the other as a friend who is ready to help, a friendly relative. It is not a requirement of ‘loneliness, to the contrary, it is a truly communal practice,’ ‘reinforcement of societal ties.’ [12], [14]

The real care of the self consists of stepping aside at a distance from one’s pursuits and keeping that distance which allows one to observe oneself and events – but not to detach oneself from the world, rather to change the scale of the observation. When one is seen as a little point at a single moment in time, inserted in a bigger picture of the enormous world, the self acquires the necessary attitude. Here, in Foucault’s analysis these manipulations are viewed as exercises and practices designed to train people for ‘future battles’ of life – battles in metaphorical sense, perhaps something not too different from the expeditions we discussed in the previous chapter.

PHATIC COMMUNICATION

As Dreyfus noted, “around the care of the self, described by Foucault there developed an entire activity of speaking and writing in which the work of oneself on oneself and communication with others were linked together.” [13] In fact, the Communication theory has described such link long before Foucault through the term ‘Phatic communication.’ Phatic communication is communication “that serves to establish or maintain social relationships rather than to impart information, communicate ideas, etc.” [16]. The most obvious example is a small talk about weather: “It is a nice day today. – Oh yes, the weather is great!.” See also the blog entry by Ziggy Marzinelli cited above.

However trivial such exchange may seem, there is a strong argument to be made that phatic functions influence all social interaction and are fundamental to human communication generally. As Zeynep Tufekci argues, “We are a deeply social species and we engage in “social grooming” all the time, i.e. acts that have no particular informational importance but are about connecting, forming, displaying and strengthening bonds, affirming and challenging status, creating alliances, gossiping, exchanging tidbits about rhythms of life. I personally doubt that there is substantially more social grooming going on today, on average, compared to the pre-Internet era. The only difference is that the Internet makes it visible.” [17] Phatic linguistic behavior belongs to the Technologies of Self because participants use language for contact establishment rather than information transmission. Thus they can be said to use conversations as ‘tools at hand,’ as Paraskeue.

The Other in the Communication

The Other – who is important for the phatic communication and for Technologies of Self in general – is already built in the social media as well as interactive gadgets and interactive arts by design,

due to the 'built-in cooperation' of the web 2.0 and the new media. [18] The way the new media designed (i.e. their built-in cooperation) turn them into a perfect tool for the phatic communication. What is important for our argument is that as in the phatic communication people use words and bits of information as tools for the contact establishment, similarly people use interactive settings (gadgets, environments, social media etc.) as tools for the self-reassurance, in other words, establishment of contact with themselves, a self-mastery. The flux of personal information people daily publish via interactive websites of Web 2.0 is not information, nor communication in the strict sense. And that is when the term "Technologies of Self" comes useful.

NEW MEDIA AS TECHNOLOGIES OF SELF

To view new media as Technologies of Self means:

- 1) to center analysis on the human side of the 'human – machine' interaction.
- 2) to get rid of the Cartesian worldview and to view users of the new media as intentionally interacting with the environment and/or themselves (rather than as passive spectators).
- 3) to start viewing manipulations, which users produce with the new media, as a sort of activity interesting in itself, irrelevant of the content.

Today we are exposed to a constant flow of information mediated by all possible types of devices. To preserve oneself in this flux one has to work hard to constantly reproduce one's own integrity. [19] Kierkegaard asserts that only in the higher form of existence 'the ethical sphere' one has a stable identity and one is committed to involved action. Stability of the identity is attained through connection to an 'idea' as in Schiller's definition of the sentimental poet.

In our times people have no other resistance tools than creating their own counter-flux in response to the flow attacking them from the outside world. Naturally, the easiest available 'Paraskeue' they have at hand is themselves. For the outside observer they may behave like Narcissus. [20] But as we noted above, interactive environments created by the new media have in-built cooperation by which they have the necessary Other already incorporated in the setting. Thus the user is not necessarily a Narcissus. A better way to describe him is him being engaged in 'Care of the Self' activities.

MODERN AUDIENCES: NARCISSUS, NOMADS, MAKERS?

Dreyfus thus concluded the practical outcome of Kierkegaard's critique of disengaged disinterested Public: 'Since expertise can only be acquired through involved engagement with actual situations, what is lost in disengaged discussion is precisely the conditions for acquiring practical wisdom.' [4] In our modern age, could this 'practical wisdom' come from the skills we all acquire in our everyday use of the modern interactive media? Can the phatic function of our actions – what Heidegger calls 'the saving power of insignificant things' – be considered as a possible resource of such practical wisdom?

As the results of our research suggest, in the human – machine interaction in the artistic setting people put the interaction first, above the content. Audiences of the social media also provide examples of such phatic acts. For example, Alex Stockburger thus describes file-sharing communities like Warez: "*Tightly knit mediated communities of individuals to connect and share an event that does not necessarily have to do with the consumption of the music that is shared. It is the speed of the transfers and the fame that can be gained with being the first to 'release' a particular title that motivates their actions. Here [...] music is not heard and not even necessarily collected.*" [21]

Mash-ups (also known as vidding) provide another prominent example. Politically charged mash-ups (informational) co-exist along fan vidding (phatic). Fan vidding is a production of mash-ups through re-editing excerpts of one's favorite film. Jonathan Macintosh exemplifies both types: politically charged mash-ups and fan vidding, both with a pinch of social criticism. [22] Similarly, blogging represents informational blogs as well as purely phatic blogs.

Army blogs are typical phatic blogs. Upon joining the army (on the obligatory basis), young guys start producing tweets several times more often than when they did while at home. Not because they are in shock of the new, but to the contrary, because they fight the dullness of the army routine. Just as participants of the expeditions to the Silent Zone and the Antarctic described above they do not use social media to entertain themselves, neither to produce knowledge. All they want is to engage in a phatic communication, phatic activity which in their circumstances plays a role of a Paraskeue – a Technology of Self.

This seems to be a solution how the new media can help us in creation of a sort of 'ethics of the Self' which Foucault considered "*a vital, politically necessary task, if indeed there is nothing else to rely on when resisting the political power than the relationship with self.*" [12] Dreyfus thus describes how one can learn to develop such a relationship with oneself, via 'art of life' or 'care of the self,' "*a sensitivity to one's current style as a style enables one to collect now-marginal practices from the past which in turn allows one to engage in a loosely ordered multiplicity of activities that give life meaning or beauty, while at the same time contributing to slowly changing the totalizing background practices that endanger human freedom.*" [13]

I believe that thanks to the habitual quality of the new media manipulations, modern young people unconsciously learn 'technologies of self' – i.e. how to read one's life like a book, build one's life like an artwork, develop attitudes towards circumstances which do not depend on one, see one's life as a chain of lessons, which make one stronger. [12]

SOME PRACTICAL IMPLICATIONS

When these youngsters come to visit our interactive installation

they approach it the way they got used to – i.e. via familiar scripts of new media manipulations. Some artistic and even commercial projects try to incorporate these scripts. See for example Walt Disney's experiment with introduction of iPads into movie-going: "Disney's latest re-release of the 1989 classic *The Little Mermaid* came with a twist: the company encouraged children to bring and use their iPads during the screening. Using *The Little Mermaid* App, audience members can play games, compete with other participants in the theater and sing along with the music as the story unfolds." [23] In our artistic laboratory "Acoustic Images" we too look for the ways to incorporate our findings in our art works. The unconscious reaction of the audience has become more important to us than a straightforward interaction script of 'action – reaction.'

CONCLUSION

Interactive environments in the arts often offer unfamiliar circumstances with built-in cooperation. Thus the only reasonable way to respond to them is to copy behavioral scripts proved to be successful in familiar interactive settings. Most often these are the settings of the social media and electronic gadgets.

In unfamiliar circumstances of immersive interactive settings a paradox occurs: the public artificially recreates distance by using their interactive devices. This behavioral script has been noticed before, but previously it was taken for psychological screening, protection from the setting. Now, in the light of the above argument, we can suggest that the public – yes, creates the distance – but the aim it seeks is to reflect on the setting (artwork etc.), rather than to withdraw. Vygotsky shows that distance is needed for aesthetic response; Sentimentalists proved that distance is necessary for a proper reflection.

In the unfamiliar settings the distance is particularly needed. People turn to their gadgets both to create that distance in the immersive setting and make it familiar and comfortable. Further research is needed in order to study these behavioral scripts for their subsequent incorporation into our artistic, social and technological projects. The term which we propose 'Technologies of Self' can help in the further research because it seems to describe more accurately the aesthetic response of the interactive arts' audiences.

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TRANSCODING ACTION: EMBODYING THE GAME

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ABSTRACT

While playing a video game, the player-machine interaction is not solely characterized by constraints determined by which sensors and actuators are embedded in both parties, but also by how their actions are transcoded. This paper is focused on that transcoding, on understanding the nuances found in the articulation between the player's and the system's actions, that enable a communication feedback loop to be established through acts of gameplay, a process that is established with actions of the player aimed at the system and with actions of the system aimed at the player. We propose six modes of transcoding that portray how the player becomes increasingly embodied in the system, contemplating the moment where the player's representation in the system is substituted by her own actual body. This ongoing study aims at an understanding of the relationship between the interactant and the system's operations, raising the awareness on how the former's organic body and the latter's hardware are entangled in a communication process that allows the system as a whole to develop. This cybernetic relationship shapes our interactions and its relevance goes beyond the scope of video games, being found in all sorts of interactive media.

PERFORMANCE: PLAYER AND PROXY

Diverse hardware components have been combined throughout the short history of video games in order to provide multiples ways of interaction between the player and the game system. From that, several interaction devices were born. Some became obsolete or out of fashion. Others prevailed and even became ubiquitous. While operating those devices and depending on their particular characteristics, the player performs specific actuations that may vary in terms of amplitude, speed, rhythm, etc. These may include more than gestures, such as sounds or speech and even actions that are less controllable or perceptible such as those that derive from the autonomic nervous system. [1] But disregarding their kind, we may say that, while operating an input device, the player manifests her actions through her body and those manifestations compose a sort of performance. And it is this performance that is monitored and interpreted by the game system, registering very specific data that is subordinated to the diverse kinds of input devices that are in current use.

By operating those input devices the player interacts with the game world. In some games, for the player to act in the game world, she needs to control a game element that serves as her proxy. This proxy is her representation in the game world. It is not necessarily her representation in the story of the game. The player's proxy is the game element she directly controls and with which she puts her actions into effect. It is her surrogate, an actor. [2] With this in mind, her proxy can be her avatar, the playable character she tries to incorporate, assuming its role in the narrative and in the game world itself. But may also be the arrow cursor

that she manipulates by pointing and clicking, putting various functions in motion and even instructing her playable character or playable characters.

The player may also not necessarily be fixed to a single proxy. Some games allow the player to exchange control between diverse playable characters, as in *Thomas Was Alone* (2012) or even control them simultaneously, as in *Brothers: A Tale of Two Sons* (2013). But by being more attentive, we may notice that is also very common for the player to be able exchange control between playable characters and other elements on screen during play, such cursors, arrows and other gameplay elements usually featuring graphical representations. So, in the end, we may say that the relationship between the player and her proxy is more accurately characterized in the plural sense: the player and her proxies.

This paper focuses on the articulation between the performance of the player and that of the entities that serve as her proxies in the game world. In other words, it is about understanding how the player's actuations relate to the expressions of those that represent her in the space of the game, but it is also about comprehending when are those proxies dismissed and when does the game space incorporates the player's actual body. So, to conclude, it is important to stress that what is explored here is not only the relationship between the player and her playable character in the game world, but also between her proxies in game space.

SPACE: PLAYER AND GAME

In *A Casual Revolution: Reinventing Video Games and Their Players* Jesper Juul differentiates between 3D space, screen space and player space. [3] 3D space corresponds to the world space of a three-dimensional game. Screen space is the two-dimensional surface that is the screen itself. Player space corresponds to the physical space where the player is situated. Juul identifies these diverse spaces in casual games, stating that "video games started out as two-dimensional games on screen space, became windows to three-dimensional spaces and now with casual games we see many games returning to both the two-dimensional screen space and to the concrete, real-world player space of the players."

Taking these categories into consideration, we discerned two kinds of space that the game system and the player are involved in while playing: player space and game space. Player space is, as Juul defines it, the physical space where the player resides. The player's physical body can never leave this space, as it is intrinsic to its very own existence. Player space also envelops the hardware necessary for the player to play, whether they are input or output devices, such as game controllers and screens, respectively. It may also enfold other players' actual bodies, which may eventually

interact with each other while playing but out of the scope of the game's game space. For example, in local multiplayer games, such as *Super Mario Kart* (1993) communication is also established in player space and outside of the realm of game world itself. Players talk, yell, laugh, etc. and even come in direct contact with each other. With this in mind, player space not only is where players actuate but also where they may eventually interact with each other outside of the game world. Game space is the space where the actual game world is. Whether it is one-, two- or three-dimensional; whether it is viewed through large or small screens or even virtual reality goggles; whether it is portable or not; whether it is listened through headphones, loudspeakers or simply doesn't feature sound at all, the game space is where the player engages in play, it is the space she is driven to inspect while playing, discovering its residents, characters, objects, locations, events, etc.. In sum, game space is where the game actually happens.

Game space is commonly represented in audiovisual terms, but other and diverse modalities are often combined with the intent of immersing the player into the game world. This necessity for immersing the player in game space has been increasingly noticeable over the years. Game technology commonly favors some modalities, such as visuals, in detriment of others, such as audio or haptics—something that is discernible by the increasingly investment in graphics over the past decade. Notwithstanding this asymmetry in the development of game technology, game space may incorporate many elements of the physical world, as we will see ahead.

TRANSCODING MODES

Transcoding can be clarified as the conversion process from one coded form of representation to another. In video games the information that is transmitted in a feedback loop between the player and the game system results from the sensorial, interpretative and actuative capabilities of each. The term *transcoding* is thus used in this context to illustrate how do the actual actuations of the player realized in player space are represented in the game space.

We have briefly explored this concept in the past. [4] However, in this paper we present a revised and expanded version on the phenomena of transcoding featuring a more suitable and deeper arrangement along with new modes. The proposed modes of transcoding are divided in two major groups: intangible, exploring diverse modes of articulation between the player and her proxy in game space, and tangible, inspecting diverse relationships between the now merged player and game spaces. It is important to notice that these modes of transcoding are transversal to diverse kinds of representation, whether the game is based on simulation or not.

Intangible: Game Space ≠ Player Space

Intangible transcoding occurs when player space and game

space are separate, when they are apart. In this case, the player needs at least one proxy in game space in order to act in the game. The player actuates in player space and, by means of the most diverse forms of input available, the game system registers and transcodes her actuations to her proxy, which, on her behalf, acts in game space. So, as the relationship between player space and game space is intangible, so is of the same nature the relationship between the player and her proxy. We propose three modes of articulation between the player and her proxy that feature an intangible transcoding. These are regulated by principles of similarity or similitude, from arbitrariness, to symbolism, all the way to mimicry.

Arbitrary articulation

An arbitrary articulation between the player and her proxy occurs when there is no direct correlation between their actions. And due to that arbitrariness, the player is usually subjected to instruction, learning even the simplest procedures in order to play the game. Even trivial routines such as moving, walking or running may require the player to be instructed or to learn by trial and error, on how they are performed.

In this kind of articulation the pressing of a button may correspond to potentially anything. Thus the player cannot play properly or at least as intended, until she learns what every push button, knob or other input device does. This kind of articulation is usually established according to norms and conventions – many of them seeded by classic gameplay mechanics – that are imposed by the game system. In fact, we may say that the shape of contemporary game console controllers is the result of years iterating hardware with the intent to improve the articulation between the actuations of the player and her proxy in game space – although some try to break with the current trend, such as the *Wiimote*¹.

So, in games like *Super Mario Bros.* (1985) the player doesn't need to actually jump to make Mario (the playable character) jump. And the same happens in *Super Street Fighter II* (1992) where the player doesn't need to actually perform a kick for her playable character to kick. The player only needs to press the corresponding push button on the game controller. It is this divergence in the actuation of the player and that of her playable character – her proxy – that reveals the nature of this kind of transcoding; a relationship that, in this case, we classify as arbitrary. We may find an interesting example in *Pong* (1972) – in which the graphic elements are of a more abstract nature –, where the player rotates a knob in order to move a paddle up or down. Rotating a knob bears no resemblance whatsoever to the movement of the paddle, a movement that consists of translating up and down along the screen – the game space. They are apparently unrelated as the nature of the player's actuations and the actions of paddle diverges. But, if the movement of the paddles consisted of rotation instead of translation, the articulation between them would be different, as the actuations of both the player and the paddles would be more similar, more related. But in this case, their articulation is forced.

Despite this arbitrariness, the game system doesn't need to expose and instruct the player on all input procedures. The fact that they are hidden may drive players into exploration and their discovery may grant status, bragging rights and even prolong the longevity of the game. At the end of each fight in *Mortal Kombat* (1992) the winning player is granted a very brief opportunity to gorily kill the loser's playable character with a special move called 'fatality.' The execution of this move is not necessarily easy, as the player needs to press a very specific combination of buttons/keys in a very strict and timely fashion (combo). Each character possesses its own fatality move and each move is enacted by a different combo. These combos are not taught by the system, nor they are made very evident or intuitive. Actually, back then it was pretty common for players to write down the combo, to avoid forgetting it. And much of this information mainly circulated outside of the game itself, in magazines and through word-of-mouth. So, their counter-intuitiveness, their somewhat complex performance, their difficult memorization and the limited time span and opportunities in which the players could perform them contribute to their inaccessibility. And it is this hiddenness that often and also elevates their desirability.

In sum, an arbitrary articulation can be accomplished either by *revealing* the input procedures and *instructing* the player; or by doing the opposite, *hiding* input procedures and instigating the player to *explore*, in a process of discovery by trial and error.

Symbolic articulation

"Through the use of simple gestures like quarter turns or moving to the left or the right with the analog stick, the game creates a deeper connection between the character's in-game actions and the real-world actions of the player playing the game. Although the player's motions are still abstractions of the in-game actions they invoke, the deeper connection formed between them is surprisingly powerful." [5]

A *symbolic articulation* occurs when there is a partial correlation between the player's performance and that of her proxy in game space. Although their performances are not exactly the same, they are similar, they are analogous, they bear some resemblance or at least suggestiveness or even complementarity. We can find again an interesting example in *Super Street Fighter II* (1992). For the player to execute the *hadouken* (a surge of energy that is shot towards the direction the playable character that invoked it is facing), controlling either *Ryu* or *Ken* (two playable characters), she has to perform the following combo: move the joystick or the d-pad a quarter of a circle, starting from down and followed by the 'punch' key (↓, □, →, punch), in a single swift move. Although occurring at very different scales, this movement is similar to the movement that is performed by the player's avatar, where first it crouches a bit and then thrusts forward with its arms shooting the energy ball. In the same game, jumping is attained by pressing the 'up' key, crouching is done by pressing the 'down' key and moving by pressing the 'left' or

the 'right' keys, respectively. The arrangement of these keys on the gamepad and some keyboards is done respecting this spatial logic, where the 'up' key is placed at the top, the 'down' key at the bottom and the 'left' and 'right' keys are placed at the left and at the right, respectively. There is also here a symbolic articulation regarding the arrangement of these keys and their functions in the game world and, consequently also with the implicit movements of the player when executing those actions, either by moving the joystick or the d-pad up or down, to the right or to the left.

In *Metroid: Other M* (2010), the player has a third person perspective side view of the game space, while holding the game controller sideways. But when she rotates the controller pointing it at the screen the perspective of the game space changes to first person, allowing her to closely inspect the surrounding environment. This creates a symbolic articulation between the player and one of her proxies – the camera.

Fahrenheit (2005), *Heavy Rain* (2010), *Beyond: Two Souls* (2013) and *Asura's Wrath* (2012) often prompt the player for specific input that symbolically relates to the actions being performed on screen. Whether for punching, evading or other countless actions the player is instructed to follow the movement of her playable character with the analog sticks or even with the entire game controller, in a timely fashion. After the tutorial levels in *Beyond: Two Souls*, occasionally, the game doesn't even present non-diegetic information to inform the player what to do in order to succeed or even that her input is required, e.g. take into consideration the fighting sequences where the player needs to follow the movements of *Jodie* (a playable character) with the game controller's analog sticks to attack or to avoid opponents.

Mimetic articulation

When the player's proxy imitates the player's performance, when their actuations are homologous their articulation is *mimetic*. The player's actuations are mapped and reproduced by her proxy in the game space, with diverse degrees of fidelity that depend on the diversity and granularity of the sensors used to monitor the player. As mimetic articulation regards the movement of the player's body, computer vision, accelerometers and similar resources commonly used.

In *The Legend of Zelda: Skyward Sword* (2011) when the player raises her arm holding the game controller, her playable character raises its sword. When the player swings her arm, that character swings its sword. Due to the mimetic articulation established in this game, fighting is a very physical activity and consequently may get pretty tiresome after a couple of hours playing the game.² Games like *Wii Sports* (2006), *Dragon Quest Swords: The Masked Queen and the Tower of Mirrors* (2007), *Heavy Rain: Move Edition* (2010), *Red Steel 2* (2010), *Kinect Star Wars* (2012), *Puppeteer* (2013) are also similar examples. At a smaller scale, in *Tearaway* (2013) the player is able to touch the rear touch sensitive panel of the PlayStation Vita – the supporting

portable game console – to give the impression that her fingers are emerging from the ground in the game world, interacting with the characters and the environment. Here the representations of the player's fingers on screen directly map her own actual fingers' movement. "[P]erformative games [...] emphasize a physical response that requires the cybernetic integration of the games' challenges into the players' cognitive, kinaesthetic and perceptual functions." [6]

This also happens when playing *Pong* (1972) using a trackpad as a game controller. The players slide their fingers up and down in order to move the paddles also up and down in game space. In this manner, we may also consider that the movement of the players fingers is being mapped and reproduced in the motion of the paddles. Juul enunciates that "[m]imetic games move the action to player space." [3] In our model mimetic games possess an intangible articulation, due to the fact that the player still acts by proxy in the game world, whether that proxy is a character or a simple arrow cursor. But these games are, in fact, on the threshold of tangibility.

Tangible: Game Space = Player Space

Tangible transcoding occurs when the player space and the game space are the same. This means that the player's body is fully or partially embed in the game space. As a consequence the player's proxy in game space is dismissed as her own body now acts within it. Where intangible articulations are regulated by principles of similitude, tangible transcoding is not. Here a paradigm shift occurs, as there is no need to articulate the player and her proxy in the game space, because the latter is dismissed, thus veering the focus of transcoding from similitude to spatiality and physicality, to exploring not only the gestural amplitude of the player's actuation in relation to the scale of the game space, but also to the involvement of her physical body in that same space. This not only permits the player to act within the game space, but occasionally also allows the game space to act on the player herself. This questions the feeling of safety sensed by the players within the magic circle of the game. [7], [8] Where once the game was make-believe, it is now half-real. Not in the sense that Jesper Juul defines it as being caught between real rules and fictional worlds, but as being situated between fictional rules and real worlds, if you don't mind the wordplay. [9] Meaning that, because the game space and the player space are the same, real dangers and challenges of the actual physical world apply. Things that may have not initially been contemplated in the game itself and that may go from encountering unfriendly people or animals, to trespassing private property, to diverse physical injuries when risking reaching unsafe locations or performing diverse or unnatural body movements or poses.

The system itself may also injure the player. One example is the *Painstation* (2001), where the players are physically punished. This game consists of a variation of *Pong* (1972), where each of the two players controls a paddle trying to avoid the ball from

hitting their goal. If the ball hits the goal, going beyond the paddle and hits one of the bricks that rest there, the player is punished. Each brick represents a different punishment: electroshocks, heat and whippings. The punishment is applied on the players' left-hand, that rests on a specific platform. If the player removes her hand from that platform, she loses the game. The *Painstation* website even featured an image gallery called the "hall of pain," presenting images of the players' injured hands.³

Another example may be found in *Metal Gear Solid* (1998). Already deep into the game, there is a moment where Snake (the playable character) is caught by the enemy and tortured. To resist torture and to avoid the character's life bar energy from draining to death the player has to quickly press specific button on the game controller for increasingly longer periods of time. The player may also submit to the enemy at any time by pressing another specified button. This is a decisive moment, in which resistance and submission bear significance to the final outcome of the game and failure means game over.⁴

So, after a while the player gets a bit exhausted with a minor sore arm due to the stress of continuous and rapid pressing of that button. In-between torture sessions, Snake is taken to a holding room. There, Naomi – another game character – communicates with him by means of a hidden device. Snake then tells her that his arm hurts, to which she answers by instructing him to place the game controller on his arm. The game 'breaks the fourth wall' here, as Naomi is actually talking to the player and not the game character. And as the player follows those instructions, the game controller starts to vibrate, massaging and relaxing her actual physical arm.⁵ In essence, the following examples explore a relationship between game space and player space focused on the involvement of the players' body in the game, from smaller and finer movements that require a partial involvement of the player's body, to ampler ones that demand a full body involvement, all the way to the indispensable need for the player to travel, as that involvement becomes geographic.

Game Space < Player Space

Games that resort to natural user interfaces become evident here, where the player establishes direct contact with the game world and its residents, exerting influence upon them. In *Fruit Ninja* (2010) the player slides her fingers across the screen, cutting the fruit that is thrown into the framing of the screen. Here, the player touches the visual representations of the fruit, cutting it. *Angry Birds* (2009) is another although simpler example, where the player pushes and aims the birds on the slingshot by also touching their representations on screen.

The game space in these examples is closer to what Juul describes as screen space, where the game happens in the actual two-dimensional space that is the screen itself. And although the two-dimensional plane of the screen (game space) is situated in the same space as the player space, what is important here is not

its two-dimensionality or even that both of these examples use touch sensitive technology, but they only require a partial involvement of the player's body when playing. The player only uses her hands, maneuvers her arms at most, to play these games, as the game space is much smaller than the player herself. In these cases, the game space is restricted to size of the screen.

But there is more to this kind of articulation than that. A tangible articulation means that players may actually touch each other, which may actually be an important component of the play experience itself. While playing *Fingle* (2012) the players need to follow the movement of several shapes that are represented on the screen, touching them and consequently intertwining each other's fingers, an experience that is of a rather physical and of a somewhat sensual nature. So, here touching the other player is essential to the experience, as certain types of movements and the resulting friction between both players' fingers and hands is the focus of the game. It thus raises the awareness that players are actually situated in play space, physically interacting with each other. In *Finger Tied* (2012), instead of following several elements represented on screen as in the previous mentioned game, the player needs to guide similar ones by dragging them with her fingers. It is usual for this game to force the player into making harsh physical movements, stressing the articulations of her hands and fingers. Here the experience is more aimed at dexterity, pliability and adroitness in solving the presented challenge, but nonetheless a felt physical experience.

Game Space = Player Space

When the game space and the player space possess an equivalent size, actions that involve the whole body are possible. In other words, if before we were focused on actuations that are contained to a portion of the body and that featured a finer degree of movement, here we are looking at actuations that are ampler and to gestures that express the involvement of the whole body.

Dance Dance Revolution (1998) is a dance/rhythm game in which the game controller consists of a platform with the coloured arrows laid out in a cross. In order to play, the player needs to step onto that platform and to hit the corresponding arrows with her feet, following the visual cues on screen that are accompanied by music. This kind of actuation involves the whole body of the player. As Juul states: *Dance Dance Revolution* "does feature a display, but most of the game's spectacle is in player space." [3]

One may say that if the player only needs to place her feet at the correct arrow in a timely fashion, the action is still focused on a part of her body – her feet or her legs at most. That may be true, but and in response, moving her feet or legs like that is an action that involves the body as a whole, finding balance while establishing rhythm, becoming a full body engaging experience, such as is dancing or even walking. But with that discussion in mind we may find another and more straightforward example in Johann Sebastian Joust (2010). This is a game with no video

feedback in which each player is given a motion controller. Players have to avoid the controller from registering sudden movements, remaining still when the music is playing slowly and trying to jostle other players' controllers while the music fastens its pace, as the tolerance threshold is less strict then. The last player standing wins. The game space of this game envelops the players' whole body, as they have to move around, avoiding attacks from other players and finding balance when attacking.

Game Space > Player Space

Location-based games are games that depend on knowing the location of the player, tracking them along with other game elements. These games usually force the player to travel in order to play. So, here game space not only envelops the player's body, but the geographic space she inhabits as well. As a consequence, these games need to be fairly mobile, usually relying on GPS technology in order to track players' locations and on augmented reality features to provide information of the surrounding environment. *Ingress* (2013) is a location-based massive multiplayer game in which players choose to belong to one of two factions: *The Enlightened* or *The Resistance*. Their goal is to claim portals that either belong to the opposing team or are unclaimed. These portals are spread across the planet and, in order to find them, players have to travel to their geographic locations. In *Ingress*, we may say that the dimension of the game space is potentially as big as the planet Earth itself. As it features such a massive scale, the player is forced to travel. The focus of this game is not to monitor the players' movements per se, but their geographic locations. That is what makes the game progress.

Coderunner (2012) is another example where the player, acting as a spy, has to travel to specific locations in order to play the game. Here the player has to leave and retrieve intelligence files without meeting anyone, something known as a dead drop. To create a dead drop the player has to choose a location, mark it on the map, protect it with a password and point to or plant a clue in the environment so that other players can access it. So accessing a dead drop not only means that the player has to travel to its location, but also to unveil what is behind the clues, inspecting the actual surrounding physical environment. In fact, at its official website it is said that "[t]he *REAL WORLD* is the game map!"⁶ That statement clearly demonstrates the fusion that exists between player space and game space.

CONCLUSIONS AND FUTURE WORK

We are aware that a single video game may put to use several of these modes of transcoding across diverse moments of gameplay. We cannot thus make the claim of being able to make a mutually exclusive classification. But we can, however, state that some video games assume one of these a predominant type of transcoding throughout the game and also that we are able to discern them in specific gameplay moments. Nevertheless, questioning on how these modes work together is necessary for figuring out what kind of dynamics they promote and how these

affect the experience of play. Something that is crucial in subsequent research studies.

Also, exploring asymmetric gameplay using different types of transcoding in multiplayer games may also reveal relevant data, probing the relationship between similarity, disparity and complementarity, affecting the dynamics of play and eventually its relevance to the unfolding narrative. We are also considering subsets for each of these types of transcoding. Finding, exploring and understanding variations featured in the diverse examples that represent each of these modes may also contribute to a better understanding of the dynamics of play and player experience.

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ENDNOTES

1. The Wiimote or the Wii Remote is the Nintendo Wii's game controller with motion detection capabilities.
2. Video games in the The Legend of Zelda series require the player to invest considerable amounts of time.
3. More info at <http://www.painstation.de/>.
4. At the time of writing, the Metal Gear Solid (1998) torture scene could be viewed at <http://youtu.be/oHUi1TNNGD8>.
5. At the time of writing, the in-game screening of this event could be viewed at <http://youtu.be/cyOtFqvK-U?t=30s>.
6. More info at <http://www.coderunnergame.com>.

FROM A MEMORY OF A SMELL TO SMELLS OF MEMORIES

Josely Carvalho, Independent Artist, Rio de Janeiro, Brazil; New York, USA

ABSTRACT

A presentation of artworks from *Diary of Smells* where olfactory is a protagonist next to image and sound. The emphasis is directed towards the conceptual parameters that have directed the inclusion of olfactory in the work of a printmaker. The combination of nanotechnology to hands on works is present in the discussion. The audience will test the original smells produced as part of the artworks.

DIARY OF SMELLS

The sense of smell doesn't allow protection. It can invade the most remote areas of our emotions and our memories. A memory of a smell has been my entrance to the olfactory art realm. In 1981, I had a smell memory of my grandmother saying when I was 6 or 7 years old: Go take a bath if you don't want to smell of codfish. A series of installations, performances & paintings, entitled *Smell of Fish*, became banquets of pleasure exorcizing poetically the stigma placed upon female desire. Smell was not present, only its memory.

The first sensory perception is the odor of the amniotic fluid. From this first experience, we begin our exploration of the world. The inclusion of the olfactory in my artwork results from my long examination of society's basic need to be sheltered in a moment in which the sense of home (nest/carapace) has been disturbed by the insecurities brought by ethnic wars, migrations, political divisions and, especially, the environment's brittle state. A series of installations were constructed around the concept of "Shelter" followed by "Nests," the place where the first sense, the sense of smell, meets our basic necessity of protection. *Smell of Nest* was produced in collaboration with Givaudan do Brasil and three other smells (Hot Sun; Wet Earth; Open Sea) as a representation of our collective nest – our planet in its present fragile state will be sensed.



Fig. 1. *Architectando*, 2009, Josely Carvalho, 500 resin glass molded branches, photographs, mirrored film.



Fig. 2. *Passages*, 2012, Josely Carvalho, 1000 resin glass molded branches, smells, computer programming, video projection, six channel sound, mirrored film.

Smells can transport us to places and impel us to travel through time. We can identify, memorize and recognize places, people and emotional events through our sense of smell. *Flasks of Smell* is an interactive on-going installation whereby people are given empty perfume bottles and asked to fill them with a memory-smell. The notion is to remember a smell only through its memory, archiving it through a visual representation. The flasks have collected smell memories from different cities of Brazil and the U.S. At the moment, it contains 750 smell flasks.



Fig. 3. *Smell Flasks*, 2012, Josely Carvalho, 750 perfume bottles filled with a memory of a smell.

What are the smells that keep the memory of a town? This was the question I brought to a three month residence in a small town Viana, Espírito Santo, Brazil. In three different segments of the community we used the perception of smells as an identity tool, a way to redefine the relationships with each other and with the place. Olfaction became the raw material or essence in the exchange of experiences and the development of strategies of involvement, collective installations and my own individual artwork.



Fig. 4. *Uruku*, 2012, Josely Carvalho, 750 branches dipped in glue and urucum, sound, smell and video.

The personal quality of smell identification together with our poor vocabulary to describe and document odors, their evanescent character and the prejudices attached to the sense of smell in our rational culture are some of the challenges we artists may encounter in placing olfactory in a visual and sound oriented contemporary art canon. My present work *Diary of Smells: Shards* involves the creation of six original smells in collaboration with Givaudan do Brasil. Its concept comes from my collection of broken wine glasses. As part of the artwork, memory stories were collected after the question: *What is the smell memory of the moment of a wine glass breakage?* The texts became the source of original smells (i.e. *Absence, Emptiness, Pleasure, Gardenia, Illusion, Affection*) presented in the form of an olfactory book-art. The book makes use of nanotechnology inserting smell microcapsules in the fibers of handmade paper.

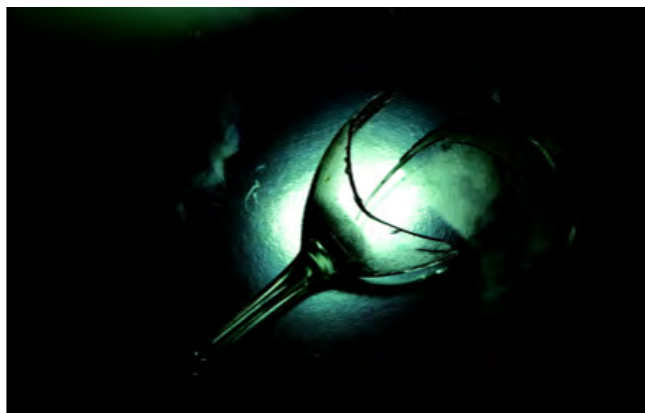


Fig. 5. *Shards*, 2014, Josely Carvalho, photography in olfactory book-art.

SCENT OBJECTS, DESIGNING SPATIALITIES THROUGH SMELLS

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ABSTRACT

The text is concerned with subjects and their bodily boundaries as zones of acceptable or uncomfortable closeness and smells, to discuss spatial navigation by implying on recognising the territory – limits and borders, before exploring it. Firstly, some women art objects will be presented to discuss about social borders and everyday rituals. Last, my art work in progress *SmellTags*, that its main objective is to evoke perceptive relationships and formalizing urban spatial interventions through smells. Like scent marks, those exploratory movements /body displacements can provide information on actions of people to a border area and create a communication system using patterns. It is necessary to comprehend mobility as people's behaviors among distinctive spatial dimensions, combining bodily zones with shared collective spaces. Considering habituation or adaptation of the sense of smell and its occurrence, the *SmellTags* project works with smaller time intervals to diffuse smells and to recreate dynamic spatial vicinity of the performer – it means to perceive the presence and/or be perceived by others. So, smells improve aesthetic engagements to define an active spatial experience.

INTRODUCTION

Considering the human experience as a cultural construction of the senses – seeing, touching and hearing, smell can improve spatial practices so as to give meanings to specific locals and to acquire a sense of direction. It seems that our nose, no less than our eyes, seeks to enlarge and comprehend the world, suggesting other possible modes to occupy the space. “The world is present, in perception, not by being present (e.g. represented or depicted) in consciousness all at once, as it were, but by being available all at once to the skillful perceiver.” [1]

The text is concerned with subjects and their bodily boundaries as zones of acceptable or uncomfortable closeness and smells, to discuss spatial navigation by implying on recognizing the territory – limits and borders, before exploring it. Considering that “scent may add a novel dimension to primarily visual representations of space by evoking the memory or emotions associated to it,” it is possible to affirm that scent objects can relate a particular place to social rituals rather than simply its spatial structure. [2] Firstly, some contextual personal women objects will be presented to discuss about social borders and everyday rituals. The intention is to present references of physical objects to investigate body spaces configurations sensorially, employing smells as a means of establishing social exchanges and relationships (producing and disseminating information) and to evoke a direct experience (using odoriferous substances to inspire and share particular kinds of presences and places symbolically).

Understanding body as a construct – layers of cultural inscriptions transformed in a dynamic relationship between humans and

technical artefacts, scent bottles were chosen from distinct historical periods (for example silver scent bottle from 350-300 BC; musk balls from 1500-1854; growing jewelry from 2009) and with different materials and technologies made (for example metal, polymer, glass) to reflect about everyday routines and interpersonal relationships.

Last, the *SmellTags* work in progress is going to be presented, that its main objective is to evoke sensory relationships and formalizing urban spatial interventions through smells. “Scents are episodic; they have a point source, dissipate in space and are associative. [...] Scents are subliminally immersive; we readily become part of the invisible scent of a landscape.” [3] The intention is to create immediate, direct and not usual sensory experiences, since nowadays we have spaces resulting often in homogenized environments, described by Richard Sennett as “the monotony and the tactile sterility which afflicts the urban environment.” [4] Wearing a scent object, the idea is to confront others with different smells to inspire and share particular kinds of presences and maybe to create emotional reactions – as attitudes of attraction or repulsion. Like scent marks, those exploratory movements/body displacements can provide information on actions of people to a border area and create a communication system – patterns, generating a possible balance between mobility and stability. It is necessary to comprehend mobility as people's behaviors among distinctive spatial dimensions, combining bodily zones with shared collective spaces. Considering habituation or adaptation of the sense of smell and its occurrence in less than a minute, the *SmellTags* project works with smaller time intervals to diffuse the smells and to recreate dynamic spatial vicinity of the performer – it means to perceive the presence and/or be perceived by others. So, smells improve aesthetic engagements to define an active experience of environment.

MATERIAL OBJECTS AND SMELLS

Starting with the designer, Marije Vogelzang, who delves into the realm of retro-olfaction – the experience of smell as flavor, it is to think about the possibility of scenting the tools we use to eat. She created these wooden eating utensils, which allow users to taste the flavors of things they cannot or would not want to actually consume things like the tomato leaf, delicious to smell but poisonous to ingest. So, the idea of presenting objects sensorially can potentialize its meanings and modes of uses. Her process with everyday objects remake the everyday body and make sentence itself an artefact. Quoting Raymond Williams “to the sight three things are required the object, the organ and the medium,” the medium is as an abstraction of the practical relationship between the organ of the sight and things seen. [5] So, the object is understood as the medium – the mediation, in which a constitutive human activity is abstracted and objectified.

Quoting Carla Mazzio, “as textual artefact, stage property, object of exchange, cultural spectacle, sumptuary habit – we might consider what happens to the tangible object in the domain of sensory perception,” in particular today, in the olfactory universe. [6] This text brings together specific objects and the universe of smells, in the domain of artistic projects in which physical materialities conform to the practice of smelling, in the same way, the sense of smell structures and codifies patterns to model objects and their uses and more specifically behaviors.

Considering the human experience as a cultural construction of the senses – seeing, touching and hearing, smells can improve spatial practices, determine bodily boundaries, creating zones of acceptable or uncomfortable closeness. Working with a specialist perfumer, Daniele Bortotto developed three silicone objects, each intended for a specific location and purpose. Silicone Dispensers were infused with their bespoke fragrance during the moulding process so the scent is literally contained within the object – unlike standard scent dispensers that need to be activated in some way. The enticing color and shape are no accident: Bortotto wants people to draw their faces closer to the object as they had be drawn to flowers. The *Silicone Dispensers* project (Fig. 1) explores the interplay between the senses and mood and by serving as a design-focused alternative to traditional room fragrance, they subvert what the designer calls the ‘typology’ of scent-related objects. [7]



Fig. 1. *Silicone Dispensers*, 2012, Daniele Bortotto. Font. <http://cargocollective.com/danielebortotto>.

Quoting Paul Rodaway “scent may add a novel dimension to primarily visual representations of space by evoking the memory or emotions associated to it,” we understood that smell can add another layer to the representation/narrative/object and it is possible to affirm that scent objects relate a particular place to

everyday rituals rather than simply its spatial structure. [8] From this idea of embedding the smell into objects, firstly, some contextual personal objects will be presented to reflect about society – what is experienced and what cannot be experienced within a culture at a given moment. Henri Lefebvre wrote “where an intimacy occurs between ‘subject’ and ‘object,’ it must surely be the world of smell and the places where they reside.” [9] Reaffirming the body/artefact relationship as a social construct – as layers of cultural inscriptions – some containers of smells are going to be presented in specific periods to think that the smell states a sense of transitions, of thresholds and margins, which reveals the processes by which beings and things are perceived and transformed.

In both Greece and Rome, personal use of perfume was common, even to the degree of having different body parts scented with different scents. Households were also heavily fraganced: even animals such as dogs and horses were sometimes perfumed. Reasons were both aesthetic and practical: cedar kept away moths and smoke (from burning incense) kept away rodents. During the Middle Ages (The Late Middle Ages was marked by difficulties and calamities including famine, plague and war, which much diminished the population of Western Europe; between 1347 and 1350, the Black Death killed about a third of Europeans), the fundamental awareness of scent was as an indicator of disease. Intrinsically, the Middle Ages saw smell (of plague, for example) treated not as a sign of disease but as the disease itself. The late eighteenth century saw a sanitary revolution: a revival of the bathhouse, moving towards private baths and showers, starting with the upper classes and moving down. The body turns into a biological machine. Vinaigrettes were decorative containers for emitting aromatic vinegar to cure fainting spells or offer relief from unpleasant odors. They normally contained sponges soaked with perfume. A process of increasing attention to cleanliness and sanitation continues today, possibly to an extreme and we have seen a return over the course of that progress to increased use of scent. In an opposite way, the *Growing Jewelry* (2009) collection of hand jewelry (Fig. 2), according to Hafsteinn Juliusson, is an experiment in drawing nature towards man, as nature being the presupposition of life. It brings an attitude. [10] In the same way, the *Blossom Pendant* (2009-2010), designed by Izik Levy and the *Scent Vessel Ring* (2013), designed by Anna Brimley, are both a container of fresh and dried flowers, respectively.

More recently, Jenny Tillotson, Ben Hughes, Gareth Jenkins and Andreas Manz have researched how to deliver scent with the *e.Scent device Project* (2006), by fusing emerging technologies with perfumery, to create a new level of experience and well-being. The study identified a new method of aroma delivery, by embedding microfluidics into responsive jewelry, to benefit health through olfaction stimulation of the autonomic nervous system. The jewelry explored delivery issues around the defense mechanism in bombardier beetles, providing a novel communication system to wirelessly send a scented message. [11]



Fig. 2. *Growing Jewelry*, 2009, Hafsteinn Juliusson. Font. <http://www.hafstudio.is/growing-jewelry/>.

CHEMICAL COMMUNICATION: CONSTRUCTION OF SPATIALITIES

Smell is one of the chemical senses and the other being taste. With these senses we sample our environment for information. Quoting Paul Rodaway “Smells do not offer scenes or views, objects arranged and set a distance from the observer. Rather, smells are present or not present, in varying degrees of intensity and subject to the movements of air. Smells infiltrate or linger, appear or fade, rather than take place or situate themselves as a composition.” [12] So, smell give us access to a world around us – informing relevant informations, such as the presence of food or another individual – a wider array of stimulation some of which we choose to sniff but much of which bombard us, that is, we encounter without choice.

The chemicals detected by our sensory systems need to have certain properties. For instance, odor molecules must be small enough to be volatile so that they can vaporize, reach the nose and then dissolve in the mucus. This tells us that smell, unlike taste, can signal over long distances (an early warning device). Volatile compounds have low molecular weights that detach from the scent mark and become airborne, while heavier molecules remain in the scent mark or substrate. As compounds become airborne, they are lost from the scent mark and so scent marks that signal using lower molecular weight compounds require more frequent replenishment to maintain signal integrity.

A scent is volatile and that is why it is so precious. In *Scent Jewelry Project* (2012), this contemplation of transience has been translated into a series of attractive glass rings filled with essential oils (Fig. 3). For Sofie Boons, they play with the duality between the desire to preserve the ornament and the temptation

to smell the perfume inside. [13] Susanne Sous works with the ephemeral nature of smells – and yet of striking wearability – creating soap and candle rings. Olfaction seems to create a time-space relationship, both at the level of current durations of odors in space and in the lingering of odors in memories. Even more transience is celebrated with the invention of biscuit – and ice rings. You can eat them you can cool a sting with them – whatever you do they are of provoking contrast to the demands of eternity demanded ordinarily and in the past from the value of a piece of jewelry. [14]



Fig. 3. *Scent Jewelry*, 2012, Sofie Boons. Font. <http://sofieboons.com/catalog/alchemy-of-scent/#all>.

Another important reference is the *SCENTence Project* (2012). It is a perfume container that uses an alternative way to apply the perfume to the skin (Fig. 4). The piece functions as an invisible stamp and only the wearer knows what is written and the presence of the words can only be smelled. *SCENTence* was designed to question the methods of choosing a scent nowadays and studies the connection between words and smells. The perfume designed by the perfumer was in direct response to the quote that is incorporated in the design. [15]

As Avery Gilbert wrote, the longer you are exposed to an odor, the more it fades into the background and you adapt to it. But the “adaptation is a temporary change – it does not erase permanently the ability to smell. Fragrances are not written in disappearing ink. The extent of adaptation depends on the nature of the smelling being done.” [16]



Fig. 4. *SCENTence*, 2012, Sofie Boons. Font. <http://sofieboons.com/portfolio/scentence/>.

When the odor source is removed, the nose gradually regains its sensitivity. So, “adaptation is a two-way street: odor strength and odor specific. The stronger the smell, the more you adapt. Ten minutes on the processing floor of the garlic factory will cause more adaptation than ten minutes talking to someone with garlic breath. But, if you work in a garlic factory, your nose will selectively tune out garlic, but your sensitivity to roses, sour milk, nuts and other un-garlic-like smells will be unaffected.” [17] Just as auditory adaptation, by having a talking in the middle of a rock concert, olfactory adaptation constantly re-calibrates our noses to background conditions. It also selectively tunes new smells into the background, freeing our attention for the next new scent that may be creeping our way. It changes according to the stimulus, but it is not a physical change.

So, sensory adaptation involves the gradual decrease in behavioral response with repeated application of a particular stimulus over time, while the habituation is a long-term physical change whereby an organism becomes unresponsive to an unthreatening stimulus. “From sniff to spin, the nose and brain constantly reshape our awareness of the smellscape.” [18]

The brain actively regulates the physical and cognitive aspects of odor perception: it exerts moment-by-moment control sniffing to govern how much scent enters the nose; it systematically dials down the intensity of one smell to prepare us for the next; it automatically makes a provisional interpretation of a smell, based on context cues, to prime us for a behavioral response. So, the adaptation process results in a system most effectively driven by changing stimuli – static background odors can be filtered while novel odors or odors fluctuating in intensity are able to be filtered.

Considering the possibility of wearing a scent object, my intention with the *SmellTags Project* is to confront others with different smells to inspire and share particular kinds of presences and maybe to create emotional reactions – as attitudes of attraction or repulsion. The proposal is to provoke sensory encounters, formalizing spatial interventions through smells. The physical intervention is a fact since we are able to close our eyes but we cannot close our noses. Smells do not happen to a passive nose alone.

In the biological world, attraction and repulsion are seen in the action of plants and animals. The plant is attracted to light and moisture and repulsed by darkness and dryness. The animal is attracted to food and safety and repulsed by lack and danger. Plants and animals are also attracted to their kin and repulsed by their non-kin, because there is strength in commonality. However, too much sameness becomes toxic. It is the tense dynamic between attraction and repulsion that creates much of the living world and its richness. The perception and construction of spatialities depend on the way “space is experienced directly as having room in which to move. Moreover, by shifting from one place to another, a person acquires a sense of direction.” [19] Thinking about creating situations of attraction and repulsion, the

SmellTags Project creates folded geometry structures to be able to spray smells for each movement of the form and its respective pressure (Fig. 5). The intention of defining this movement is to create an odorprint, “a group of molecules present in certain ratios that might be quantitatively different for each individual on the planet [...]” [20] It is seen by some researchers as similar to facial features in the sense that no single or individual measurement on a face can be used by itself to recognize an individual. We all have our own personal chemical pattern composition.



Fig. 5. Prototype of the object. The *SmellTags Project*, 2014, Luisa Paraguai.

Scent marking not only demarcates boundaries, but in addition it may provide intruders with a means of assessing the number, status and physiological state of territory holders. The project concerns with the everyday life routines and possible scent marks to create distinct modalities of presence as a “plurality of relatively privileged moments” quoting Henri Lefebvre. [21] The proposal is to reveal hidden elements of space and place – ambient qualities, that could be used to immerse, persuade, mislead or create a more pleasurable cartographic experience.

The proposal of a scent object is to work with those odor prints as encoded sensory representations of specific spatialities. As visual artist I want to create materialities related to perception – to evoke body spatial experiences sensorially. Like scent marks, performer’s exploratory movements and body displacements provide information and create a border area, a communication system – patterns, generating a possible balance between mobility and stability. It is necessary to comprehend mobility as people’s behaviors among distinctive spatial dimensions, combining bodily zones with shared collective spaces using the smell as the medium.

FINAL CONSIDERATIONS

Quoting John Stewart “without action there is no world nor perception,” we comprehend the olfactory domain as possible

relationships between objects' shapes and our body spatial consciousness. [22] The materiality and shapes of them are modulated by smells. It means that the appreciation of their shapes consists in our perception of its profile and understanding of the way the profile or apparent shape depends on movement – the shape will be available in the experience of smelling. [23]

Wearing a scent object, my proposal is to evoke an object permanence – a consciousness of the form to create a sense of presence. It is important to map traces of memory and to establish possible relationships between smells and places in order to create other realities. "Like the intellectual acts of seeing and hearing, the senses of smell and touch can be improved with practice so as to discern significant worlds." [24]

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THE POLITICS OF SMELL: HOW SCENT TECHNOLOGIES ARE AFFECTING THE WAY WE EXPERIENCE SPACE, SENSE OF PLACE AND ONE ANOTHER

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ABSTRACT

This essay explores the history of our relationship with smell, from the perfume industry to the burgeoning air-freshener and deodorizing industry. It examines how smell can deeply effect the way we experience space, our sense of place and one another. It examines how advancements in smell simulation technologies are being used and manipulated, not simply by corporations as an elusive marketing tool, but by governments to support and promote their agendas of war. And, as they embark on some of the most advanced research into smell, this essay looks at how these technologies are also changing and challenging artistic practice as artists begin to question and counter with research and agendas of their own.

SENSORIAL ESTRANGEMENT

Estrangement from the senses and from the natural world they enable us to perceive charts a long history. One could say that the path was set with the development of written alphabetic language, for this form of communication began to replace the sentient means of transmitting and receiving meaning (such as body language, non-verbal sounds, touch, taste and smell) of which our natural world was a part. As communications became increasingly word-based they began to exclude the surrounding environment – rendering Nature more “inanimate object” than “living, breathing and communicating” – and altering our social relationships. Yet, while written language may have marked the beginning of our separation from the natural world and sentient engagement, it was with the onset of the modern industrial age (and factory labor) that capitalist agendas began to break down heterogeneous, multi-sensorial, *lived* experiences of duration and rebuild them into the homogeneous, reproducible fragments that speed and profitability inherently demanded. Our experiences became increasingly stripped of all that made them unique, fluid and intimate, creating a longing that needed to be filled and making us vulnerable; in the age of industry, this need was filled through object consumption. In the contemporary age of media and technology however, this consumption extends well beyond objects and into our most intimate social fabric. Isolation continues to be manufactured, yet now the means through which we access and experience intimacy are becoming redesigned as well.

As our reliance upon heavily ocularcentric technologies evolves and our daily interactions become more deeply immersed in remote, fractured, often-virtual experience, our reliance upon and relationship with our senses devolves. And while these technologies are, on the one hand, literally at our fingertips, offering the impression that everything is close and that we are able as never before to configure our own individual experiences, they are, on the other hand, highly mediated, homogeneous and stripped of direct multi-sensorial richness. Here as never before,

the media responsible for connecting us so effectively to one another also inherently prescribes physical and psychological estrangement. And at the same time that our technologies distance us from sentient experience, they enable us to more effectively dupe the senses, creating fully fabricated images, sounds, smells and tastes. Experiences are no longer simply mediated but can now be manufactured to reside deeply within our sense memory.

THE VULNERABILITY OF SMELL

While all of our senses become increasingly susceptible to manipulation within this contemporary condition, smell may actually be among the most vulnerable. The perfume industry has a long history of enhancing or altering our body's natural odors to make them more attractive, masking the smells we don't like with ones that we do. And while this is not new, as Constance Classen notes in her book *Aroma*, “smell is hardly ever considered as a medium for the expression of class allegiances and struggles” nor is it seen to have the power of sight or sound to serve as a “political vehicle.” [1] While it is one of the most emotionally potent senses and is thought to be one of the strongest triggers for memory, it remains the least considered. As experiences become more fractured and we become less familiar with and tolerant of the natural smells around us, olfactory simulation technologies continue to advance. Now they are being developed and utilized not simply by the perfume industry to make us smell better, but by corporations as a subversive marketing tool and by governments to facilitate war. And, as they embark on some of the most advanced research into smell, these technologies are also changing and challenging artistic practice, as artists begin to question and counter with research and agendas of their own.



Fig. 1. *Anthropodino*, 2009, Ernesto Neto, mixed media, Installation view of at the Park Avenue Armory.

Ernesto Neto, quickly becoming one of Brazil's most important artists, creates immersive environments meant to reacquaint us with our physical selves and with sentient experience. He constructs large installations that reference the body's interior. Often made from thin, semi-translucent, stretchable fabrics that recall human flesh, they, at times, also include intensely aromatic spices that fill portions of the material and hang down like giant organs, releasing their scents into the air. Visitors are invited to move inside these spaces and to "experience" the work more than "view" it. With installations such as *Anthropodino*, housed in the Park Avenue Armory in New York in 2009 and *The Edges of the World* at the Hayward Gallery in London, 2010, Neto says he was much more interested in the air inside the sculpture than in anything else—that his passages "privilege the air." [2] In an interview about the work he noted the importance of re-engaging the senses within a culture of remoteness "*I wanted to touch people with smell because it is very dangerous to [physically] touch people*" alluding to both the desire for and resistance against direct human closeness. [4] In this way, Neto not only uses smell as a potent reminder of the sentient nature of our being, but perhaps also as a means for exposing our estrangement from this nature within daily experience. For, while the vast, industrial space of the Armory in which *Anthropodino* is housed is all-too familiar, within the close, lush, fleshy, smelly interiors of the work we are somewhat displaced.

Intellectually elusive and emotionally potent smell, more than any other sense (save taste, which functions together with smell), has the ability to elicit feelings that are intensely visceral. A smell can trigger a deeply embedded memory we may not even "remember remembering" because odor memories accumulate "outside of awareness." [4] And this bank of smell memories develops even without our conscious knowing; we need not intend to smell smells or be attentive to their presence, yet they build up and are stored with every breath: Etymologically speaking, a breath is not neutral or bland, it's cooked air; we live in a constant simmering. There is a furnace in our cells and when we breathe we pass the world through our bodies, brew it lightly and turn it loose again, gently altered for having known us. [5]

The nature of our response to smell operates outside of language. "Our sense of smell can be extraordinarily precise, yet it's almost impossible to describe how something smells to someone who hasn't smelled it. Smell is the mute sense, the one without words, lacking in vocabulary." [6] These smells that we draw in can subconsciously evoke responses that are deeply emotional. They can trigger feelings of comfort, yet equally quickly set off a kind of squeamish disgust and this forms one of the predominant aspects of smell. This inherently visceral response opens an even greater vulnerability as our culture becomes ever more obsessed with purification for, while we are drawn to smells that are 'good,' nothing serves to keep us in a state of isolation and remoteness more than the *fear* of the unclean. Ivan Illich in his essay *The Dirt of Cities*, *The Aura of Cities*, *The Smell of the Dead and Utopia*

of an Odorless City notes how our tolerance and attitude toward bodily smells began to shift as we became more deeply acquainted with the process of death and decay.

[The living] demanded a special apartheid between live bodies and corpses at just the time when the innards of the live human body were beginning to be visualized as a machine whose elements were "prepared" for inspection on the dissecting table. The dead became more visible and less awesome [...] The presence of the dead was suddenly perceived as a danger to the living [...] For the first time in history the utopia of the odorless city appears [...] Space had to be stripped of its aura once aura had been identified with stench. [7]

THE SMELL OF COMMERCE

Corporations understand and are increasingly capable of making specific use of this olfactory vulnerability. The perfume industry was developed to feed a growing desire to the mask odors (specifically body odors) that came to be defined as unpleasant and soon we began to equate 'good smell' with status—the better you smelled, the richer you were. That has changed over the years however, as ever more intimate interactions reside within increasingly remote technologies and we become further obsessed with purification. Classen notes, "The olfactory social scale is the reverse of what it was in earlier ages in the West [...] Now, however, power resides not with perfumed potentates, but with inodorate businessmen." [8] The burgeoning and much more recent air-freshener and de-odorizing industry preys upon our *fear* of the unclean and fuels the belief that some smells need to be eradicated altogether. It is no longer enough to 'mask' a foul odor so as to make it tolerable; it has now become necessary to 'kill' a dangerous one in order to make it safe.



Fig. 2. *Fear 9*, 2006 Sissel Tolaas, scent, Image via: <http://www.ediblegeography.com/talking-nose/>.

Norwegian artist Sissel Tolaas is one of the first and most significant artists to work with smell. With a background in mathematics, linguistics and chemical science, she became interested in working with smell as a means of communication

and to see what can be learned when it is distilled and decoded. Tolaas embarked on some of the most advanced research into chemically simulated smell and in 2004 established the research lab IFF re_searchLab Berlin for smell & communication. In her project the *FEAR* of smell – the smell of *FEAR* (presented in several different iterations in exhibitions including the Tirana Biennale in 2005 and at MIT's Visual Art Centre in 2006) she used smell to situate viewers directly between the conditions our techno/human interface prescribes us to inhabit; the need for intimacy within the experience of remoteness and the utopic vision of purification within the inescapable reality of stench. [9]

In this project Tolaas collected the sweat from 14 – 25 men in various parts of the world, all of whom are prone to anxiety and panic. She developed a tool that, when placed under the arm during an attack, captures sweat molecules and records their smell. Tolaas then took those smells into her lab where they were broken down into their various chemical components and recreated. The simulated versions of each individual's scent were then reprocessed into molecules and embedded into a special paint that would release the smell upon touching. [10] For the exhibition, the artist prepared a freshly painted white room, devoid of any visual stimulus and fully reliant upon our senses of touch and smell to engage. The gallery space presented a utopian vision—pure, white and unsullied. The simple act of touching however was enough to break the veil of purity and expose the odor of the body. Once released, these smells elicit an experience in the “viewer” that is involuntary and anti-intellectual, as our response to smell is inherently subconscious and visceral. And this response, different for each individual, could reveal much about where each of us resides within the techno/ human condition. For some the initial white room may have appeared comforting and clean, while for others, cold and unsettling – and the smell of the bodies? Some visitors reported being overwhelmed by feelings of nausea and disgust, while others (such as a woman who returned to the exhibition daily and spoke to the scent of one particular man) found the smells to be familiar and intimate. [11] Not only were visitors affected in some way by the experiences their touch and smell afforded, but they also affected the space in return, contributing traces of themselves as the oils from their hands became overlaid onto the ghost scents and built up upon the surface.

While Tolaas' makes use of the long-standing tradition of the “white cube” very specifically in this work, her choice of body odor (as opposed to any other smell) also holds particular significance. There are many different kinds of smells that can evoke disparate individual responses ranging somewhere between the pleasant and the putrid, but our response to the smell of the body is particular. Carolyn Korsmeyer, in her book *Savouring Disgust* notes that disgust is an “aesthetic affect” that can only be elicited in response to organic material experience in response to living matter. [12] This is because disgust is a feeling that alerts us “to the presence of danger indicated by decomposing vegetable or

animal matter.” [13] Disgust is elicited when we are pushed up against the reality of our decomposing nature. The more difficult this becomes to reconcile – the further removed we become from the notion that we are mortal beings bound to decay – the greater our fear and disgust in the face of it and the greater our desire for and comfort in, an eternal state of purity. Korsmeyer explains the phenomenon in this way:

The aesthetic affect [of sublate disgust] gains intensity from the hallmark visceral repulsion of disgust, which registers the inescapable, dolorous frailty of material experience [...] organic life is mortal, we are living organisms that will live out our allotted time and then pass from existence. Part of that passing away is a stage where the remainder of our corporeal selves will suffer disintegration and putrefaction. No one is surprised to make this discovery. But like so many existential truths, its magnitude slips through the mind and cannot be held. The sublate aspect of aesthetic disgust permits a moment of sustained recognition, providing a time to dwell upon mortality from a particularly intimate and fragile perspective. [14]

In the *FEAR* of smell – the smell of *FEAR*, Tolaas uses simulated smell to reconnect us back to the reality of the body. She has noted that, with the constant bombardment of perfumes, deodorants and sterilizers in the atmosphere (arising from our desire to banish the smell of our mortality), we no longer even know what our bodies truly smell like. Her work to collect, dissect, decode and recreate these smells is in an effort to “go back to zero” to “bring us back to the origins” of what we no longer smell. [15] And in the contemporary environment, not only are the smells that we deem unpleasant being masked by something more desirable, but more and more we are learning to erase the smells we don't want and replace them with ones we do want.



Fig. 3. Smell of fear, Sissel Tolaas. Image via <http://crossjack.blogspot.ca/>.

The fast-growing air freshener and de-odorizing industries were built upon and perpetuate a growing *fear* of the unclean. Now we are not simply covering over unpleasant odors, we are sterilizing a dangerous environment. The more *fearful* we become of our corporeal condition and of the contaminated environments that

threaten it, the more products we consume to protect us. And at the same time that we buy products to rid our surroundings of “bad” smells, we are inspired to shop for others through the infusion of “good” ones. As consumers become increasingly savvy about “artificial” scents, corporations work to develop more convincing simulations of the real. Where we once smelled perfume with an undertone of the original ‘unpleasant’ odor we can now smell coffee where there are tires or lilies where there are over-worked bodies. Smells are being simulated and orchestrated to such a degree that we can now be completely duped. They no longer relate to the existence or presence of something, as they no longer require any point of origin; something that exists need not smell and a smell need not come from something that exists. A McDonalds french-fry, no longer cooked in beef fat can, through chemical simulation, still smell (and taste) as if it was. [16] And this simulation will also assure that every french-fry, no matter how good the potato crop, will smell exactly the same. Every new car, shopping mall bathroom or florist’s rose can, through chemical simulation, have its smell exactly determined and precisely duplicated. In this way, even smell is being broken down and rebuilt into homogeneous, reproducible, mediated fragments. This ability to chemically reproduce, manipulate and control smell, known to so effectively and elusively influence us, offers it up to corporations as a most effective marketing tool. And it may also offer it up to governments to advance their agenda of war.

THE SMELL OF WAR

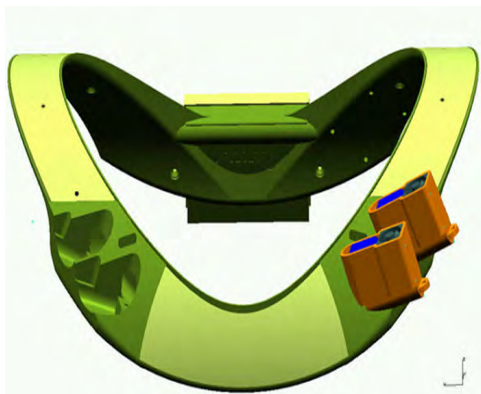


Fig. 4. USC Scent Collar, 2009, Image via: http://skydeas.smugmug.com/Professional/Morie-USC-Scent-Collar/17611389_8hcR4z/1341914470_qrcCPVP#!i=1341915751&k=MRvddjx.

The efficacy and potency of smell has also become of great interest and concern to the U.S. Government. We are sensory beings bound to our physical nature. We perceive our environment through our senses and this perception forms the basis for our understanding of self and of our place in the world—and smell, more so than any other sense, can elicit strong, deeply ingrained responses to what we perceive. The government soon began to recognize that the responses triggered in soldiers by the smell of war were running directly counter to those required to carry it out.

When Sissel Tolaas exhibited her *FEAR* project in New York City, the New York Times published an article on her exhibition and research. Tolaas said that soon after, the U.S. Government contacted her about the possibility of working together. [17] They were particularly interested in the advancements she was making in chemical olfactory simulation. The U.S. Army and Department of Defense had already begun working with other artists and scientists on research and developments of their own. In 1999, they formed a strategic partnership (ICT) with the University of Southern California and several major entertainment industry leaders (including Disney, DreamWorks and Time Warner) (Macedonia, 2000) specifically focused on olfactory research. The Institute for Creative Technologies (ICT) developed the first *Scent Collar* prototype for the military in 2002 [18] for which it won the patent in 2009. [19] This collar is specifically designed for use with soldiers in virtual simulation training. Troops can be trained to fight strategically through virtual video game-like recreations of the battlefield but once deployed they are ill prepared to deal with their intense and involuntary responses to smell. The *Scent Collar*, designed to wrap around the neck during training sessions, delivers overwhelming simulations of the real smells they will encounter in battle in an attempt to acclimatize them to the smell of war: The smell/memory/emotion connection is tantalizing to military simulation experts [...] Veterans cannot forget the odors and newly deployed soldiers are often so overwhelmed by the olfactory assault that it distracts them from the task at hand. To prepare troops, the Army and Marines use simulations that expose soldiers to noxious odors such as melting plastic and rotting flesh before deployment, where the smells may be encountered for real. [20]

The *Scent Collar* is designed to train soldiers to override the very instinct that their olfactory triggers alert. Olfactory simulation affords the military the opportunity to rewire soldiers' inherent responses to smells such as decomposing matter and death – those of *fear* and disgust that alert them to danger or inspire human empathy – so that they may fight more effectively. The ability to manipulate and circumvent our natural responses to smell is becoming an invaluable tool in war precisely because the senses are our understanding of mortality, they enable compassion and empathy and bind us in a shared human experience.

THE SMELL OF COMMUNITY

Dutch artist Birthe Leemeijer began work on *The Essence of Mastenbroek* in 2005. This project elucidates how central the ability to engage with and experience the (unmediated) smells that surround us – those we have become most disconnected from – is in building our sense of self, defining our sense of place and developing our sense of community. Undertaken in a late-medieval Dutch polder in the province of Overijssel, Mastenbroek has a rich farming history. Leemeijer began working with the residents there who expressed a desire to create a visceral expression of their deep relationship to the land and community that are now coming under pressure from urban and industrial development. It was

decided that this could be communicated most potently through smell. This led to the development of the *Essence Club*. The purpose of this club was to meet, discuss and develop the scent or more importantly the combinations of scents, that embody the experience of Mastenbroek. Club members frequently met to share experiences, recount memories and pour over photographs as a means for excavating and articulating the complex olfactory landscape in which they were immersed. [21] The group was interested in finding the smell that could convey their “shared” experiences, one that could provoke something meaningful for each of them and signify their bond. They discussed the importance and impact of the changing seasons on various smells and developed an archive of those they felt most prominent such as fresh cut grass in the silo, shearing sheep in autumn, stables, fresh milk, ditches, hay, etc. Once all of the smells had been discussed and recorded, they began working with perfumer Alessandro Gualtieri. [22] The group then convened to sniff samples, home in on essential smells and work through combinations and balances until they felt they found the one that embodied and recalled Mastenbroek. Because of the complex and ephemeral nature of olfaction, smell allowed the group to create a potent reminder of this specific place, without reducing it down to any singular vision. The smell could be drawn from some common place – convey something commonplace, yet evoke for each individual that smelled it their own unique feelings and experience – something familiar yet layered and indefinable.



Fig. 5. *The Essence of Mastenbroek*, De Bron, 2005 Birthe Leemeijer, fragrance. Photo: Ben Vulkers, Image via <http://crossjack.blogspot.ca/>.

Now the smell is being distributed throughout the community and to the surrounding urban centers that threaten it. Perhaps it is in the hope that it may inspire a connection to place and community even for those who do not live there. Or perhaps it is a memorial of sorts, for a land and a lifestyle that may soon be obsolete. Many of the farms are being sold as urban communities begin to encroach and younger generations become less likely to work them. Every resident who leaves Mastenbroek is given a bottle of the fragrance as a memento of their experiences there and “owners” of the perfume are invited to refill their bottles from the large communal container known as De Bron (The Source) housed in the local visitors center. [23] The club even designed the containers and packaging for the scent and, not unlike Ernesto Neto’s lush *Anthropodino*, housed inside the stark, industrial

Armory, *L'Essence de Mastenbroek* comes in a clean white box with spare black script. Once opened, the smell is released and colourful images of the rich, pastoral landscape from which it comes are revealed inside. And not unlike the smells of bodies that fill Sissel Tolaas’ pure white gallery space some may find the smell comforting and familiar while others may find it unpleasantly pungent. But with each whiff will come an emotional and visceral response that reveals much more about the smeller’s own experience and understanding of being in and amongst the world than anything else, such is the nature of our relationship to smell.

The past decade has given rise to major advancements in smell simulation technologies. Research labs have made great strides in the development and integration of chemically remanufactured smell; however, this industry has, for the most part, maintained a proprietary and hermetic profile. Ubiquitous in its applications, from food fragrances (and flavorings), to environmental augmentations, to corporate marketing strategies, to war simulation training, smell technologies have gone largely unnoticed and most certainly under-considered, altering our environment and influencing our experience. Drawing our attention to the impact of smell through unexpected means, artists are exploring our visceral and complex relationship with the olfactory sense as this terrain becomes ever more fractured and disorienting. They have begun to respond to and in some cases lead, developments in these areas, creating new hybrid forms of practice able to question, elucidate and challenge larger social and political considerations and agendas. Elusive, invisible and emotionally potent, smell seeps into our consciousness and, whether we are aware of it or not, with each breath informs our understanding and experience of space, our sense of place and one another.

“He threw the window wide open, delighted to take a bath of fresh air [...] [T]hese scattered whiffs of perfume came together and the familiar scent of frangipane, the elements of which his sense of smell had detected and recognized, spread from the valley [...] assailing his jaded nostrils, shaking anew his shattered nerves and throwing him into such a state of prostration that he fell fainting, almost dying, across the window-sill.” [24]



Fig. 6. *The Essence of Mastenbroek*, 2005 Birthe Leemeijer Photo: Renate Boere, Image via: <http://classic.skor.nl/artefact-296-nl.html>.

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STREAM 5

EDUCATION/MEDIA



2467/3970: A SHORTCUT TO CONNECTING PURDUE UNIVERSITY (USA) AND UNIVERSIDAD DE ANTIOQUIA (COLOMBIA) IN AN INTERDISCIPLINARY EXPERIENCE BETWEEN ART AND TECHNOLOGY

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ABSTRACT

2467 miles / 3970 kilometers separates West Lafayette (USA) from Medellín (Colombia). Although this distance represents geographic, cultural and social differences, it also outlines a bridge for creative possibilities that connect two cities by an intercultural dialogue around new media. In particular, this paper describes the process and strategies that we developed between 2013 and 2014 to teach a study abroad course entitled "Interactive Art and 3D Animation" in the city of Medellín.

The purpose of this interdisciplinary course was to approach the topic of location, society and technology through each student's experience of the city. We combined each other's research expertise both in digital media and interactive visualization to create an integrated learning experience. Namely, merging Restrepo's experience leading the research group Hipertrópico – using digital media and open source software to develop socially interactive projects – with García's background on computer graphics visualization. This paper explains the collaborative efforts that brought both of these universities together, elaborating on the planning, methodology, realization and outcomes of the course in May 2014.

INTRODUCTION

This paper gives an account of the different steps that were required for the realization and socialization of the academic experience Open Studio / Estudio abierto: Interactive art & 3D animation in Medellín. The experience was designed to facilitate an intercultural and interdisciplinary exchange among students, professors and researchers from Purdue University and Universidad de Antioquia in Medellín (UdeA).

BRIDGING TRUST

This project idea was born in Sydney, Australia, at the 2013 International Symposium of Electronic Arts. We were both participating in the Latin American Forum panels. After the panel, we had a first conversation about the curricular similarities that our departments at our corresponding institutions (Purdue and UdeA) had on digital media. We both identified a great opportunity for educational research and development for the future. Upon our return, we expressed to the department heads and deans of each college our desire to solidify a Colombia – USA exchange. We would like to mention that the institutional support that we received was a strong step towards the realization of this project. To create a bridge between the two universities, we required the involvement and effort of several stakeholders. At Purdue, we were encouraged by Dr. Patrick Connolly, Department Head of the Computer Graphics Technology and Dr. Robert Cox- Dean of Globalization. At UdeA, we had the unconditional support of

Francisco Londoño, Dean of the School of Fine Arts, the Hipertrópico research group -a group of faculty devoted to the teaching and exploration on the digital arts. We were guided locally throughout this process by staff and administrators of the international relationships programs and globalization offices. All these people played an active role in the planning and creation of this intercultural bridge.

At the early stages of planning starting on September 2013, we held bi-weekly meetings via Skype. The meetings included the entire faculty from the Hipertrópico group in Medellín (Pablo Pulgarín, Carlos Mario Sánchez and Alexandra Tabares) and Esteban García in West Lafayette. This process was important to dialog and to get to know each other, as well as to outline the recruiting strategies and the content of the academic experience. These meetings continued regularly until the beginning of the course.

In November, Restrepo visited the Purdue campus to meet with the dean of globalization and other faculty at the College of Technology. We held our first student call-out and visited classrooms to promote our program, we also advertised using flyers across campus. During this four-day visit, we worked extensively to sketch the methodology of the course. During the following months (December through February) more call-outs followed and we recruited twelve Purdue students. Six UdeA students were selected by faculty to participate of this experience. We were especially intent on creating an intercultural classroom. Our entire course was bilingual, an aspect that facilitated conveying information, as well as the integration and cooperation of the participants.

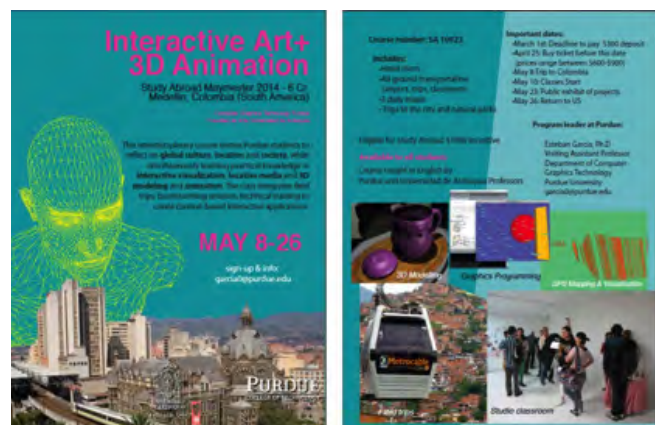


Fig. 1. Flyer for the open call, 2013, Esteban García, paper, © Esteban García.

METHODOLOGY

Inspired on the pedagogies proposed by the artist Luis Camnitzer and the idea of an open studio we designed a collaborative learning experience. At a conference, Camnitzer proposed a non-hierarchical (horizontal) teaching model in which students played an active role as co-investigators. Additionally, he outlined the challenges of teaching technology in the field of art, especially those that include programming:

"We teach the techniques of coding and de-coding without discussing the functions and relationships that they have with the perceptual actions that allow the existence and definition of these techniques." [1]

Consequently, we considered the importance of coupling technology with reflection in our curriculum design. The concept of "journey" enriched the methodology because it provided a groundwork that allowed the participants to think about on new intercultural realities and to activate them through the creation of new media projects. It is important to also highlight the interdisciplinary connections of the academic exchange as a whole. This course brought students and faculty from the fields of Fine Arts and Technology together. The course introduced students to computer code literacy and digital media while prompting them to research and create something on the topic of location, specifically in the city of Medellín. The course was themed around the topic *"Digital Cartography: Mapping the City."* Students were asked to document their visit to Medellín using diverse media, such as sketching, journaling, photography, video and audio recordings through a series of field trips. These audiovisual documents became the source material for new interactive artworks. The distribution of the activities was designed to encourage participants to integrate the technological and academic work with the contextual experience gathered during the field trips. Our plan of activities followed Camnitzer's idea in which the student drives the learning experience through their own reflections:

"Only a good plan of study is capable of guiding a student to focus on the surrounding reality and equipping him/her for the construction and refinement of the culture and community within he/she acts. In this sense a functional plan of study is like a plan of action – a strategy – and it has to obligatorily express an ideology. It is also, as an strategy, a parallel action intertwined with the individual creation of an art piece. Therefore, this is why many times there is no difference between art making and teaching." [2] All the components of this course were woven together by field trips inside and outside the city, brainstorming sessions, technical training, conceptual dialogues and experimental input from all co-investigator participants. During the first week, students gained technical competence in the areas of programming and 3D animation through lectures and exercises. In the second week, both individual students and student teams developed their own projects reflecting on the course topics and

content in the studio. By the end of the second week there was a public exhibit of the resulting projects at the Cultural Center of Universidad de Antioquia. The image below shows an outline of the schedule:

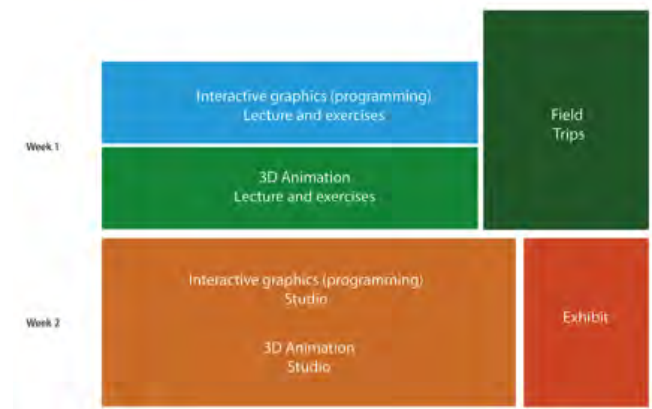


Fig. 2. Structure of the course, 2013, Esteban García and Isabel Restrepo, digital image, © Esteban García and Isabel Restrepo.

To provide the students with the opportunity to get familiar with the place of exhibition, most classes were taught at the Centro Cultural Facultad de Artes. For two weeks, students used this place as both a classroom and their studio. However, participants were introduced to other working spaces, such as Ruta N Medellín, an institution that hosts one of the Purdue's global offices and that also has great facilities for projects that focus on technology and innovation.

As explained before, the personal documentation made by the students was the source material (data) for the creation of the artworks. The course involved three full-day field trips to facilitate the gathering of the data. Trips included: Parque Explora Medellín, Parque Arví and Universidad de Antioquia campus in Santa Fé de Antioquia. These field trips were also an opportunity for participants to have direct contact with geographical, social, political and economic realities and thus broadening the perspectives of all involved.

THE REALIZATION OF THE COURSE

The course started with a general introduction to the philosophy and concepts that tied the entire course experience. We started the session allowing every participant to introduce themselves to the rest of the group. This was the first point of contact between the Purdue and UdeA students. After this, we led a brainstorming session prompting the group to think about the following terms: the journey, the shortcut, journaling, blogging, location, mapping, translation, critical cartography, icon design and ethnography. For this activity, we used *An Atlas of Radical Cartography*, a book that compiles designs and essays on mapping social issues. [3] We invited the students to become aware of their surroundings and to document their experiences through journaling, sketching and digital documentation.



Fig. 3. Introductory section: Fundamental concepts at School of Art, Universidad de Antioquia, May 10, 2014, digital image, © Esteban García and Isabel.

RESTREPO

During the first week, the classroom time was distributed in two four-hour blocks that introduced students to the development of technical competencies to create 2D and 3D imagery. The first block focused on interactive graphics (Processing) and the second block focused on 3D animation (Blender). We alternated the classroom experience with field trips to Cable Metro and Parque Arví. In this way, students acquired basic skills by using the mentioned programs and, at the same time, got direct experiences of the city.



Fig. 4. Field trip to Parque Arví, May 13, 2014, digital image, © Esteban García and Isabel Restrepo.

The work done in Processing emphasized the idea of connecting two disciplines: Art and Technology. A search that is presented in the philosophical conception of the Processing language:

"Hybrids that can fluidly cross the chasm between technology and the arts are mutations in the academic system. Traditionally, universities create technology students or art students—but never mix the two sides of the equation in the same person. During the 1990s the mutants that managed to defy this norm would either seek me out or else I would reach out to find them myself. Bringing these unique people together was my primary passion and that's

how I came into contact with Casey Reas and Ben Fry." [4]

The interactive graphics module was called "Programming for Visualization" and was structured to provide the following an introduction to programming using the Processing development environment. The module covered five thematic units in six days: (1) Fundamentals, (2) Interactivity, (3) Media, (4) 3D and (5) Processing. There were three small assignments in which the students applied the concepts from the modules. We helped each of the students or groups to assist with them with their specific programming questions and debugging. Our approach to teaching programming was allowing students to learn by doing and by letting them explore and play with the code structures and problems that we provided. The assignments required the use of their own collections of data, for example, in the first assignment, we asked them to create a landscape of the city using programmed vector graphics. Figure 5 shows an example of one of the assignments done in processing. The student integrated his vision of the city with the possibilities of creating 2D imagery through the use of processing. At a later stage these cable car images were turned into interactive programs.



Fig. 5. Cable Car (Cable Metro), 2014, Photo and digital image © Isabel Restrepo and Aaron Doenges.

The Blender workshop was called "Basic Principles for 3D Animation Utilizing Blender," and was designed under the following themes:

- Introduction to the construction and display of storyline
- Interface and basic commands of Blender
- Modeling techniques in Blender: Predefined structure, box modeling, modeling, lathe, spline, loft, path, metaballs and text
- Properties of objects and their relation to the 3D environment
- Texture and lights
- Basic principles of animation

During the sessions students were introduced to the technical possibilities of the software through examples and were encouraged to develop their own perspectives by themselves. In this way, students had the opportunity to work with the program according to their own projects and ideas. Some of the participants from Purdue had experience on working with other software for 3D modeling, like Maya, so it was easy for them to raise comparison between those programs and Blender, as an open source version. In both learning modules, students developed a series of works that primarily represented their impressions about the city and

started to observe social and cultural phenomena. This point can be seen in the amount of projects that depicted the mountainous geography of the city, the piled distribution of buildings and the aerial perspective of the Cable Metro and other characteristic icons of the city.



Fig. 6. A compilation of works done by participants of Open Studio in Blender and Processing, 2014, Digital images © Isabel Restrepo and Esteban García.

In the second week, students were asked to develop their own projects integrating what they learned in the interactive graphics (programming) and 3D animation modules with their experience of the city. The module was called “studio” and the faculty played the role of mentors in helping develop their ideas technically and conceptually. For the creation of the projects students were invited to work in teams and to depart from their own observations or questions during their journey. The studio component included the following activities: collective work sessions, brainstorming, planning, development and installation of the projects.

RESULTS

Each project revealed a unique perspective and process. The resulting projects were very diverse including interactive installations, videogames, animations and paintings. In several cases we observed that this experience was life changing in the sense that many students discovered a new passion through developing their work. We would like to mention the project *Diario cartográfico – Cartographic Diary* (2014) as an example of the studio work done by Sara Echeverri and Diana Marcela Zuluaga. The main goal of the students in this project was to capture the visitor's movement in real time, as a way to facilitate the interaction with the space using digital and interactive content. The interface of the project included a camera that was installed on the ceiling, a map that was displayed on the floor and a video projection on the wall. In terms of the coding for the interactivity, the students, in cooperation with the professors, determined the brightest point in the space as a pattern for the recognition of movement. The movements of the users were designed to active different imagery in five sensitive zones. Although the project had some technical difficulties, it was a successful experience of bridging art and technology, allowing fine arts students to begin to work with code. After the course ended, one of the students decided to further

her work in *Processing* by enrolling in a programming class taught at Universidad de Antioquia.

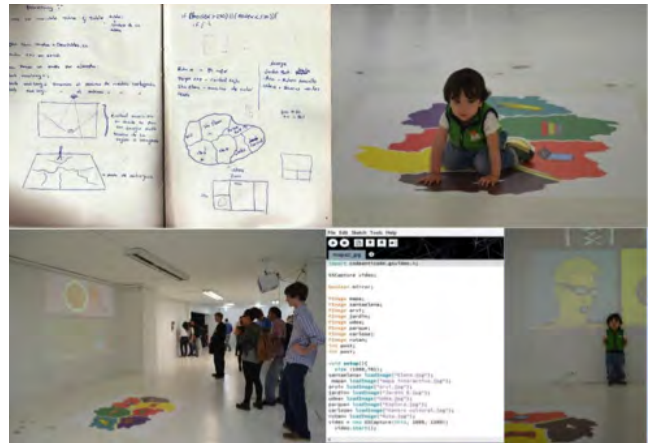


Fig. 7. *Diario cartográfico*, 2014, Interactive Installation, Sara Echeverri y Diana Marcela Zuluaga © Photos by Isabel Restrepo.

Guillermo Blanco and Alex Stamm were interested in Medellín's nightlife. They designed a survey and conducted interviews on the street asking people about their bar or club preferences. They were interested in applying this ethnographic research applied to the design of an interactive app. The project was called *Medellín: Vida Nocturna* and it provided the users information about the types of music, the cost and a rating system of the city's preferred dance clubs and bars. The app used GPS data to locate the clubs on an interactive map with diverse genres of music. Guillermo and Alex's friendship evolved into a strong designer-developer team. Both of them were so thrilled about the results that they would like to pursue app development professionally. They are currently working on a new version of the software and are planning to continue travelling around the world collecting data for their *Vida Nocturna* project.

Through this experience, another student became aware of her true passion. At the time she was enrolled as a freshman in computer graphics at Purdue, but this studio experience helped her to come to the realization that she didn't quite want to be in front of a computer and that she did want to become an artist. She realized that she was not as much interested in coding as she was in painting and upon her return, she changed her major to Fine Arts. Her experience during the studio allowed her to further explore in the area of painting. Other projects allowed students to deepen their existing interests. One example of this is the animation *Equalizing the City* by Aaron Doenges and Jonathan Simonson. The animation tells the story of a white van that strolls through the city dancing to rhythm of Salsa and Electronica music. Both John and Aaron are animation majors. For the development of the projects students worked directly in the exhibition space, allowing them to experience and learn about the display of interactive and non-interactive artworks, as well as creating an exhibition. To create a coherent unit in the space, the

faculty planned the space distribution of the projects, considering the equipment that was available for the exhibition.

PUBLIC EXHIBIT

The resulting projects were presented to the general public at the Centro Cultural of Universidad de Antioquia (Colombia) and displayed online on the site www.2467-3979.org. All participants were present at the reception, allowing students to interact with the audience, answer questions relating with their projects or provide additional information about their process. To complement the information about the exhibition and the course, a brochure was designed and distributed at the opening.



Fig. 8. Images of the opening of the exhibition Open Studio / Estudio Abierto. May 25th, 2014, © Photos by Isabel Restrepo and Alexandra Tabares.

EVALUATION

The evaluation of the entire experience was done in a rural campus of Universidad de Antioquia in the East region (El Carmen de Viboral). The students were asked to answer some questions in a written paper followed by a group debrief. In general, students highlighted as positive aspects of the course the intercultural exchange among students and professors, the possibility of developing practical projects that relates with contextual concerns, the opportunity to find new venues for their careers and the involvement that they developed for the projects, independently of a grade. Some of the comments of the students were:

Savanah Mick (Purdue): "On this trip I learned a lot about how Colombian culture differs from American and learned to appreciate and admire different ways of life."

Ryan Walker (Purdue): "I learned a lot about Colombian culture, became much more confident with Spanish and made several new friends. I learned how to wash clothes by hand too. In general, there are too many things to list on a single piece of paper."

Alex Stamm (Purdue): "In general the immersiveness of the experience is what taught me. The fact that we were forced into

new exciting experiences forced us to learn. Intensive experience brings intensive learning."

David González (UdeA): "This has been an incredible experience for me. Although in the moments previous to the beginning and during the first and second day it was somewhat stressful because of the language issue and uncertainty about the working methodology, I feel that I was able to couple with this process and to become more comfortable through the days. I found that our classmates from the USA were really nice and humble, they were engaged with the process, hard workers with lots of interesting ideas and knowledge that I hope to achieve with time."

Diana Zuluaga (UdeA): "When I heard about this project, I was very interested on the idea of being able to meet with students from another country and culture. Although the communication was difficult, smiles and gestures became the unifying bridge. It was a very positive and enriching experience in which the intensity and the complexity of the teaching did not impede interaction. I learned a few words and sentences in English, so learning to speak it like them is going to be my objective from now on."

As instructors, we wanted to finalize the course in a meaningful way by providing a space for collective reflection and feedback. This experience was very informative to us as it helped us to realize that this experience had a much greater impact on the students than we originally imagined. Overall, we were impressed with the quality of the projects, but mostly with the personal growth that each student had. After becoming aware of cultural differences, students grew into empathetic, respectful and compassionate global citizens.

SPREADING AWARENESS

The socialization of the experience has been an ongoing process that includes material in different media. The first step was writing a report that was socialized with the directors of Universidad de Antioquia and Purdue University. During the realization of the course, press articles were written in the webpages of Universidad de Antioquia. Some of the professors and students were interviewed. Additionally, some information can be found in the Facebook account of the research group Hipertrópico (comunicaciones Hipertrópico). Along with this, the professors have shared the experience in different academic events, to share, discuss and analyze the meaning of this type of experience. Our goal is to continue providing this experience on a yearly basis.

CONCLUSIONS

From the analysis of our planning, methodology, realization and outcomes of the open studio experience, we found great results on allowing students drive their own learning experience. In this way, students were motivated to have an active role in the creative process: they picked themes of interest, means for developing projects and the appropriate teams to work with. The theme of the course was a good excuse to invite the participants to explore

the city as well as learning technical aspects through the exploration of open source software.

Based on the results of the projects, the reflections and the affect of participants' decisions for future development, we feel that our experience was successful. Through this project we were able to bridge cultural and academic perspectives. Being part of a multicultural classroom facilitated a unique environment for learning that enhanced meaningful discoveries that broaden the perspectives of all involved. This exchange activated the emergence of creative thinking and artistic explorations through the convergence of art and technology.

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A THEORETICAL FOUNDATION FOR INTERLACING ARTISTIC AND ACADEMIC METHODOLOGIES

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ABSTRACT

The paper reflects upon the integration of academic-scientific methods and artistic strategies for art and technology projects that address user participation in socially defined domains. It addresses the historic and formal difficulties in combining classroom teaching and experimental artistic project work in that each belongs to a different set of epistemology and pedagogical discourse.

The paper describes its field of inquiry, namely art and technology student projects as being part of an extended art field. These projects deploy, firstly, artistic strategies and forms of expression that are the result of the cultural autonomy of art and, secondly, scientific knowledge and methods drawn from engineering, social science and the humanities alike. Consequently, these projects' trajectories can neither respect the purposeless autonomy of art or the academic discourse of finding solutions to well-defined problems. What kind of methodology can accommodate this seemingly paradoxical situation?

The paper proposes Luhmann's relative difference between medium (loosely coupled elements) and form (tightly coupled constituents) as a theoretical and heuristic tool for productive interferences between artistic and scientific methods. Art and technology projects operate within a field of existing forms (e.g., social patterns, urban and interior spaces, etc.), which must be de-coupled prior to decisions related to novel forms. Art as novel re-couplings is often considered as the artistic impetus *per se*, where form yields its own medium. But re-coupling and new-coupling is intrinsically bound to the decoupling process. Due to the complexity and objectives of art and technology (or art and science) projects, the de-coupling/re-coupling/new-coupling process necessitates a variable combination of a selection of different scientific and artistic methods depending on the type and nature of each particular project. The paper elaborates upon and exemplifies the proposed heuristic through various art and technology projects as part of university teaching.

INTRODUCTION

Since 2008, Aalborg University has been offering the study program Art & Technology (henceforth ArT). ArT is a cross-faculty educational program and research collaboration between the Department of Architecture, Design and Media Technology (part of the engineering and science faculty) and the Department of Communication and Psychology (part of the Faculty of Arts). ArT positions itself in the wake of a long history of art-technology projects conducted by individual artists, universities and art schools. As the title of the program suggests, the field of enquiry and learning consists of technology-based and art-inspired artifacts of various kinds, such as inter- or reactive artifacts and systems, dynamic urban events and participatory media projects. ArT

focuses mainly on participatory projects that involve an audience in the unfolding of the artifact or project. Many ArT projects attempt to actively participate in, operationalize and create social interactions. Furthermore, student projects address issues like sustainability, art and health care and disadvantaged neighborhoods.

ArT student projects are most often framed by set constraints in terms of theme, material or technology in accordance with a semester's learning goals. In most cases, ArT student groups begin with brainstorming leading to initial artistic ideas. One of my supervised groups decided to work with doors and an urban space in the middle of our city Aalborg. There was no analytical or scientifically motivated connection between these two ideas (doors and urban spaces). To place a door in the middle of a public space is an initial form decision and a division of spaces (i.e., inside/outside, private/public, open/concealed and confined/unconfined). If this project should have relied solely on artistic methods, the artist(s) would have continued making decisions on the basis of personal inspiration and positioning. However, the group had to imply audience participation in the form of communicative acts within a designed interaction system that included digital technology, the participating audience's conceptual understandings and practical actions. On the face of it, form decisions based on artistic inspiration seem insufficient. ArT students must be able to analyze social spaces and situations. A place can be analyzed by applying the analytical methods used in, for example, urban studies or ethnography (e.g., functional and historical aspects, user flow analysis, interviews). The findings would describe the specificity of this place and its usage.

Thus, one fundamental aim of ArT is the integration of academic and artistic methods. Each student project must decide what methods to apply, often by choosing from a variety of existing academic and artistic methods. Especially in an educational context, the question of the interplay between practice and theory is important and manifold and therefore complex. My experience shows that discussions of which methods to teach and apply and the weighing between theory-based and practice-based methods is often tainted by (art) ideology, personal training and the concrete project at hand. However, my objective here is not to take away this complexity, but to find a theoretical foundation upon which the complex relationship between academic and artistic methods can thrive and which can function as a kind of pragmatic code that helps select to choose among and integrate existing artistic and academic-scientific methods.

THE RELATIONSHIP BETWEEN ARTISTIC AND SCIENTIFIC METHODOLOGIES RECONSIDERED

Although ArT is a new initiative in Denmark, the phrase 'art and

technology' has been used in the Anglo-Saxon world (e.g., England, the U.S., Australia) for many years to refer to an array of educational programs and research fields. In these countries, art education has been part of the university system as well as research fields and communities for decades. [1] This situation has changed various art practices and, in turn, modified and extended various scientific methods. Singerman argues, on the one hand, that art has become more conceptual and has abandoned its Kantian heritage of aesthetic purposelessness and judgment. With regard to electronic art, media art and emerging bio art, collaborations between artistic and scientific discourses have created not only novel art forms but also new exhibition domains and presentation formats that lie outside of traditional art institutions and venues. On the other hand, a growing body of literature on art-based research has demonstrated the expansion of scientific methodologies through the usage of artistic methods and/or artworks, especially in the fields of sociology, psychology and the humanities. [2], [3]

Nonetheless, the distinction and integration of artistic and scientific methodologies requires an on-going discussion, simply because this integration does not come easily. Various conferences/symposiums addressing the intersection of art, technology and science (ISEA, DAC, Ars Electronica, etc.) confirm that differences in discourses and methods elicit ongoing discussions and also frustrations (at least on a theoretical level). In this context, ArT as an education and research field is compelled to define itself in contrast to artistic research conducted by art academies, on the one hand and in relation to the humanist-hermeneutic, sociological and natural science research discourses, on the other hand. ArT's foundational issues, challenges and opportunities appear to arise from these demarcations.

Of course, there are weighty socio-historical reasons for this divide. According to the sociologist Luhmann, [4] an artwork is defined by forming part of a particular social system, the system of art, which operates according to socially constructed codes, programs and media other than, for example, the system of science. Furthermore, the societal purposes of these two systems have been distinct. The purpose of art traditionally includes the creation of concrete, aesthetic experiences, whereas the scientific system pursues knowledge, primarily in the form of abstractions and generalizations (theories). It is not difficult to describe academic strategies because all academic disciplines must account for their methodologies. The humanities traditionally work with phenomenological-hermeneutic methods, in which an object (a text, artwork, music and so on) is interpreted by means of a hermeneutic spiral (or circle). Sociology employs an arsenal of quantitative and qualitative empirical methods in studies of demographic, ethnic and socio-cultural issues. Natural science promotes the scientific method, which is the verification or falsification of hypotheses by means of experiments and precise measurements. However, there exists a vast variety of

mixed or otherwise synthesized methodologies.

According to Luhmann, the system of art affords the showing of the world in the world, which includes possible but unrealized 'worlds.' In contrast, the system of science generates relatively stable factual knowledge about the existing world. [4] Art seems to work with subjective, personal experiences and interpretation. Artists are said to create by means of personal inspiration, visions and trajectories. Furthermore, an art audience is free to interpret and judge works of art subjectively (as noted by many philosophers, such as Baumgarten, Kant, Hume, Hutcheson and Hegel). [5 - 9] During the 20th century, art broadened its field by incorporating several other purposes and strategies than aesthetics (as the sentiment of beauty) such as political, social, self-referential, personal and collaborative issues. Nonetheless, contemporary artistic methods remain personal; and artists work on the basis of self-generated individual methods intended to produce singular works of art that are different from all other works of art. The *poietic* process, from idea conception to the production of work, is said to exceed the discursive logic of science. The artist uses her- or himself as a kind of transformation filter where empirical perceptions are transformed by virtue of a by Bergson inspired notion of intuition. [10] There is no shortage of metaphors for the artistic process; such as travel, sudden revelation, chance (serendipity) and fight. Artistic crafts, such as knowledge of materials and processing techniques or comprehension of other art forms, are seen as a necessary basis, which artistic inspiration must transcend to uncover novel, surprising or critical perspectives and dimensions of the world. [11]

Wilson summarizes the divide in his seminal book *Information Art*, allocating the notions of reason, normativity, explanation, validity and verification to science, whereas art is characterized by terms such as emotion, intuition and evocativeness. [12] Others have described this difference in similar ways: Eisner as "tension" Borgdorff as the field of the "unknown" and Polanyi as so-called 'tacit knowledge.' [13 - 16] Nevertheless, the divide becomes even more complex when we add the difference between the numerous scientific discourses and methodologies from the humanities, sociology, engineering and natural sciences. Stated differently, the very concept of art-based education (and research) is based upon a socio-historical paradox. On the one hand, these kinds of projects apply artistic creativity and investigation that can only thrive within the protected 'purposeless' field of art. On the other hand though, these projects cannot respect the autonomy of art because it is goal-led solutions to known questions. How, then, can we combine and amalgamate academic and artistic methods that respect art's autonomous status and simultaneously apply it to other fields?

CONSTRUCTING A WORLD

It seems clear that art-technology projects must find potential meeting points that are capable of coupling the two social domains of art and academia and also bridging the discursive divide between the various academic disciplines. Wilson, for

example, suggests creativity and the objective of improving the status quo. Relying on critical theory, Wilson states that the foundational beliefs of science have been dismantled during the last century; science is dependent on existing cultural values and symbols and on the observer's position in relation to the observed world. There are no truths, only constructions of theories that can explain the world until new and better explanatory truths are found or constructed. This insight seems to open the theoretical field for inter-methodical approaches. Of course, this is old news. Constructivism has long claimed that scientific truths are social constructions (see for example, Piaget, Glasersfeld, Bateson, Luhmann and many others), following Vico's dictum, *Verum factum*. [17] Pickering has described science as a constructionist enterprise in which different agents (e.g., materials and humans) are involved in creation processes. [18] Pickering emphasized practice as the *modus operandi* of material and human agency. The incorporation of artistic processes and artistic products into sociological projects inevitably turns them into action research. [19], [20]

In fact, many interdisciplinary (and transdisciplinary) art and technology projects have led to the emergence of not only novel technologies and solutions but also novel methods in scientific research and especially in art. I am referring to collaborations between, for example, Blast Theory and the Mixed Reality Lab at the University of Nottingham University or Stelarc's collaborations with various medical institutes that have led to the construction of a third arm or the growing of an extra ear. Why, then, should we continue to discuss the distinction between artistic and scientific discourses when reality has already bypassed these theoretical, categorical atavisms? It seems that practice has found solutions to their specific problems, whereas their generalizations on a theoretical level still create methodological problems.

My challenge is that an academic paper (such as this one) can only operate on a theoretical level by attempting to find theories and abstract demarcations and relations that help to conceptualize the possibilities of inter-methodological approaches. Therefore, my research question must be whether the distinction between scientific and artistic remains operational or whether there is another additional distinction that can solve this theoretical problem and elucidate how ArT projects, being part of an interdisciplinary education, can choose among and apply artistic and academic-scientific methods. Put differently, is there an additional distinction that could operate as a program to lead or advise the deployment of artistic and academic methods in educational and research projects and that could overcome the ideologically tainted battle between art and science?

As the additional operational distinction, I propose Luhmann's distinction between medium and form. Before presenting Luhmann's distinction, the ability of art to employ this distinction in a special way and elaborating on its application to my field of

inquiry, let me present an account of art-technology projects and their evolving subject field to provide a clearer and more concrete understanding of the field and its methodological challenges.

MEDIUM AND FORM

Niklas Luhmann (1927-1998) sees art from a sociological perspective. Works of art form part of a social function system (and is produced by this social system) that yield a specific kind of observation modus. Art is defined by form selections that uncover the contingencies of these selections or, put differently, the interdependence between actuality and possibility and this is observed by the onlooker. This does not mean that artworks consist of unconditioned form choices (as many critics of modern art have misunderstood). Instead, it means that art operates by showing potential formations, thereby uncovering the foundational contingency of 'the world' (the world is always the result of observations and is an operational part of the observer). Luhmann can thus postulate that art's social function is to show the world within the world. At the end of his voluminous book on art, he asserts, "Art experiments with fictional yet real arrangements in order to show the society within the society that there are alternatives, but precisely not arbitrary alternatives." [21] Obviously, this can be done in many ways. Expressed more technically: art and works of art make it possible to 'see' through or beyond the (re-)presented forms into an implied but unknown space that can be used for further (imagined or realized) form modulations.

To understand this very abstract proposition, we must understand Luhmann's distinction between medium and form and art's specific manner of managing this difference. He proposes that the distinction between medium and form is a relative distinction; it is not an essential, ontological distinction but one that designates two different modalities. Media is "[...] characterize[d] by their high degree of dissolubility together with the receptive capacity for fixations of shapes (Gestalt). This means media also consist of elements or events in the time dimension, but these elements are only loosely coupled." [22] The relative difference between medium and form is the creation of form through the relational fixation of a selection of the medium's elements. The distinction and dependency between medium and form holds true in many domains. Noise, for example, is a structured constellation of elements that make up air (sound waves). Air is a medium that can transmit noise precisely because it is invisible (inaudible) as a medium. Consequently, a medium cannot be observed directly but can only be inferred through form. "Despite all these relativizations, the difference between medium and form remains decisive as *difference*." [23]

Luhmann claims that art handles this difference in a special manner. Art creates its own medium in that every artistic creation (form) produces its medium. Art (making) turns our normal apprehension of the primacy of a medium upside-down by producing its own medium. This medium is not something new (because all art and art making relies on existing, primary media

such as air, materials, colors). The artistic medium is generated as the difference between medium and form. Art's medium is the very distinction between medium and form. Luhmann explains this using several examples, but one will suffice for my context. Music, he states, is received as a structured composition of sounds. The difference between everyday sounds, such as a telephone ringing or a barking dog, is that music "creates its own reservoir of selections, a space of meaningful compositional possibilities, which the specific work uses in a way which is recognizable as selection and which does not restrict other compositions." He continues, "[h]ere too through particular arrangements, a medium is again first of all created in which form can imprint itself." [24] Music can only be appreciated by those who can see (feel) that a musical composition (form) is not the only possible composition; rather, every composition forms an entrance into a realm of other possible, but not arbitrary, arrangements. In abstract terms, these possible but unrealized arrangements point at the difference between medium and form. Every singular artistic form (piece of art) makes apparent that difference as potentiality field. Luhmann furthermore claims that only art(-istic) form can reveal its medium (as the difference between medium and form).

Luhmann's specification of artistic medium as the difference between form and medium is a theoretically interesting account of art's capability to produce and communicate creation and creativity. But he also asserts that we cannot observe (create) an artistic medium without the primacy of form. Here, he unfortunately echoes the view that artistic creation is an impenetrable occurrence that reveals its medium (and its significance) post factum. In my opinion, artistic creativity is not exclusively dependent on the artistic genius but must also be seen as a system-inherent operational mechanism of the system of art. For example, every piece of art is informed by established artistic form(at)s and styles (already uncovering these artforms' mediums) and by the surrounding society in order to be recognizable and valuable. In other words, a work of art has to show its medium as potentially de-coupled elements. Seen from the angle of the artist, the process of art making (form fixation) can only be based upon acts of de-coupling. Thus, artistic form fixations must be understood as new-couplings.

SOCIETY AS MEDIUM

An additional aspect is important for my investigation: one primary medium used by many ArT projects is a concrete societal context, be it an urban space and its components, prospective users in participatory projects, etc. This, of course, is not new to art: "Finally, since the nineteenth century, we can observe tendencies to constitute with the aid of art a further medium: society." [25] This became possible because society was no longer seen as nature or creation but as the result of social evolution. Society produces itself by identifying, selecting, (re-)combining and creating its own elements. The social subsystems of science and art participate in the 'medialization' (the uncoupling of societal elements) and re-formation of society. Put very broadly, science

investigates society by means of various kinds of data collection and data interpretation with the goal of forming theories that can describe and explain dimensions of 'the world.' To be of value, these theories must be applicable to specific situations. Methods regulate not only data collection but also the application of theories in order to determine the accuracy (truth) of the findings. This process however is never purely descriptive; it constructs the (or rather 'a') world and our understanding of it. What concerns art, Luhmann is referring to modernist art that actively had been commenting on, criticizing and even wanting to modify society. In doing so, art had to acknowledge and problematize itself as part of society, which in some cases has led to solipsistic recursions. Self-reflectivity has become modern art's medium.

On the contrary, art and technology projects at Aalborg University seem to have abandoned self-reflectivity as their medium, because these projects are using concrete 'social fields' (spaces, situations, user behaviors, etc.) in their attempt to find alternative questions or even identify possible solutions to concrete and existing challenges. They are building alternative social situations. Tentatively, the interlacing between academic-scientific and artistic methods consists in divisions of labor: scientific methods partake in the de-coupling (mapping out) and re-coupling (interpretation) process of these fields, meanwhile artistic methods participate in intermediary and final form-finding processes (new-coupling) that reveal not only new perspectives on the subject matter in question but also novel mediums. Thus, the area of convergence can be characterized as the dependency between the un-coupling, re-coupling and new-coupling of the constituents of a particular subject field.

In what follows, I will examine two student projects with the goal of scrutinizing possible 'inter-methodical' strategies on the basis of the form-medium distinction.

DE-, RE- AND NEW-COUPLING AS CODE FOR INTER-METHODICAL PROJECTS

As already presented in the beginning of this paper, the ArT student group working started out by conceptually positing a door in a defined urban space. To repeat, to place a door in the middle of a public space is an initial form decision that makes apparent the mediums with which the project would work: the division of spaces (i.e., inside/outside, private/public, open/concealed and confined/unconfined). These distinctions opened up fields of inquiry in that the students would investigate the socially accepted concepts (private as opposed to public; inside as opposed to outside, etc.). This is important, because form decisions based on artistic inspiration are insufficient, if the group had to imply audience participation in the form of communicative acts within a designed interaction system that would include the participating audience's conceptual understandings and practical actions. In the same way that art painting requires a technological understanding of what paint is, ArT students must be able to analyze social spaces and situations by applying academic

methods (e.g., functional and historical aspects, user flow, interviews etc.).

These types of analytical tools transform the place into a medium. During this process, objects, spatial conditions, historical facts and actual and prospective users become de-coupled constituents with which the group can work. In this regard, also theories of the human sciences, such as theoretical aesthetics, perception theory and theory of mind, contribute to the 'medialization' of social situations, because they can be used as filters through which makes observation possible in the first place.

But we must be aware of that academic findings always appear in the form of theories, categorizations and generalizations – that is, as form. Nevertheless, considered as aspects of an inter-methodical process, these types of findings are potentialities rather than fixations. Employed as de-coupling strategies, there is no danger that academic practices will overrule the artistic process. On the contrary, academic methods and their results can further, catalyze, support and 'irritate' artistic explorations because these findings broaden the potential field of novel form fixations.

The group of students decided to focus on the thematic distinction between private and public because they wanted to transform the chosen cramped public space into a personal retreat in the middle of a busy urban area. They designed a small hut around one half of a normal park bench, while the other half of the bench remained outside and thus part of the public space. The ambiguity the park bench was thus exaggerated. The idea of the divided bench folds the private space into the public space and vice versa. To further the complexity of the private/public relationship, the students furnished the public space with pillows, flower vases and other elements of private spaces, whereas the inside of the shed was white with no additional objects except an old-fashioned telephone. Unfortunately, the student group used the number pad of the telephone as a simple interface device to give users the ability to create their own personal space by changing the hue of the inside lighting and by choosing from a range of soundscapes. In my opinion, simple research into technological, media-theoretical and sociological aspects of the telephone as a communication device could have created other potential spaces that could have led to far more interesting solutions in the interstices between public and private spheres.

Another example is a student project that consisted a method box designed for user engagement and reflection. The group decided to work in a disadvantaged neighborhood. They consulted existing demographic data and other scientific reports. The neighborhood was situated near the university and its citizens have often been the subjects of research conducted by sociology or psychology students. The ArT students became interested in the subject of observation (e.g., research observation, the large amount of surveillance cameras and their own role). They created a cultural probe box for one person at a time that specified actions in front

of surveillance cameras, Xbox cameras and the personal cameras to ignite a process of participant action and reflections dealing with the participant's own self-image, role and position within that housing area and the society at large. Scientific methods (various observation strategies, questionnaires and cultural probes) were transformed into an artistic event. The de- and re-coupling process was not altered but put into an artistic context. The participant, firstly, enacted the collection of data and, secondly, acted in front of surveillance cameras thereby transforming the purpose of surveillance into deliberate statements. The method box not only gave the participants the ability to explore their own neighborhood in a different manner but also uncovered the formational strategies involved in the production of scientific and public images of such a disadvantaged area. By doing so, the project uncovered a potential space for other investigation strategies and empowered the participants by presenting possible means of action and reflection. In other words, it constituted a platform for potential new-couplings of the elements of a disadvantaged neighborhood.

CONCLUSION

Decoupling, recoupling and new-coupling cycles are not equivalent to "the reflective practitioner" and reflective practice, as proposed by, for example, Schön. [26] Schön investigates the reflective modus of practice that differs from what he calls technical rationality. The inter-methodological challenge this paper addresses lies in the relationships and circular interferences between the artistic approach (as defined above) and academic analytical methods. De-, re- and new-coupling cycles do not aim for synthesis and the emergence of novel methodologies but rather for a fertile interference that is beneficial for concept development and the realization of artistic projects within the field of art and technology. Luhmann's notions of medium and form as relative difference are seen as theoretical tools that can explain the complex relationship between artistic and academic-scientific methods and can be used as heuristic, reflective tools in the choice of methods.

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AHEILOS VIRTUAL WORLD. CREATION AND EDUCATION IN THE SPACE OF INFORMATION

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ABSTRACT

Aheilos is an interactive 3D virtual environment functioning online that allows the creation and presentation of dynamical interactive 3D content to many users. The idea of the *Aheilos* world is to promote creative, educational and informative activity profiled for art and touching various aspects of culture functioning on the edge of art, science and technology. The virtual space shared for development in the *Aheilos* world was divided into several areas with different functional profiles in which several projects were launched, exploring the potential uses of this type of environment?. Projects initiated in the *Aheilos* world that will be showcased on the ISEA symposium: 1. Virtual reconstruction of the White Eagle Square in Szczecin in its form from 1938. Virtual 3D environment as a potential platform for sharing historical knowledge associated with architecture and urban development; 2. Remote artistic education in virtual space. Based on examples of classes that took place during the exhibition design workshop at the Visual Arts Department of the Academy of Art in Szczecin; 3. Virtual and hybrid exhibition space. Based on examples of ongoing and past exhibitions that were using the *Aheilos* virtual environment and its tools, such as 2-way real time multimedial communication, remote presence, capability of displaying dynamical interactive content; 4. Virtually aided architectural design. Presentation of the potential of virtual dynamic 3D online environments for enhancing contemporary architectural design process; 5. Experimental artistic projects using the specifics of the interactive online 3D environment.

CONTEXT OF THE AHEILOS WORLD

Game engines

Production of the technologically advanced computer games has led in time to the creation of tools automating some parts of the creation process, which have evolved in time in the direction of integrated systems for games creation, the so called game engines. That kind of systems allow the creation of interactive multimedia 3D environments, offering the functionalities of render engines, physics simulation, collision detection, sound design, animation, 3D modelling, texturing, AI simulation, network solutions and scripting languages. These tools were developed in the past mainly for the needs of one company's own projects creation, but there are present tendencies of releasing them to the public in the form of complete applications for use in game creation. The structure of such software is often consisting of trunk – the basic engine and optional components altering its capabilities according to user needs. Amongst the most popular tools of such functionality currently released we can count: Unreal Engine, CryENGINE, Unity, Blender and OpenSimulator. [1-5] Applications such as Unreal Engine or CryENGINE are dedicated by assumption to game design, but the offered functionality and quality of solutions are often beyond CAD technologies available on the market. That fact will probably cause their evolution also in that direction. An

example of such advanced functionality is the quality of real time visualization offered by these tools that is often better than the effects of a time consuming rendering process offered in software such as 3ds Max or Cinema 4d. This impression is multiplied by the awareness that this is actually an interactive navigable spatial environment that offers the possibility of designing dynamically changing audiovisual effects that can be determined by the reactions of individual users. The Crytek Company is currently working on a product called CryENGINE Cinebox which is adapting the engine interface towards CAD functionality and the Unreal Company, in partnership with the public sector in USA, has developed the Unreal Government Network – a network that allows licensing of its application in government led projects. The portfolio of this project includes a wide range of implementations in industrial, military, medical, social and space simulations.

The *Aheilos* world was built based on the OpenSimulator engine. It is an open-source application that allows building spatial virtual environments enabling access and interactive 3D content creation for multiple users. It is capable of connecting many servers in wider structures which could initialize the emergence of global 3D network (Web3D) according to the development team aspirations.

Web3D

The idea that initially stood behind the term Web3D was the replacement of presently functioning "flat" internet with an interactive 3Dimensional content. The term in time has become used to refer to all the available interactive content embedded in websites. Receiving this kind of content usually requires installation of special plugins on the web viewer or use of other interfaces. Currently there are many independently designed technologies and formats associated with the idea of Web3D, such as: Adobe Shockwave, Burster (for displaying content designed in Blender), Java 3D, Unity Web Player (for content created in Unity 3D), VRML or X3D. The two last formats are associated with the Web3D consortium – a non-profit organization created for the purpose of developing a world wide open standard of a file and engine for displaying interactive 3D content in the web. The Virtual Reality Modeling Language (VRML), created initially by the consortium, was the first language of this type acknowledged as a standard by the International Organization for Standardization (ISO). The successor of VRML – the X3D format also received ISO standardization. The idea of Web3D has caused the emergence of virtual reality 3D platforms that had the ambition of replacing the functionality of "flat" websites with a navigable interactive 3D content, such as: Active Worlds, Dotsoul or Second Life. OpenSimulator application development started in the year 2007 when Linden Labs company released the code of Second Life

viewer for modifications. The released viewer application contained most components responsible for the environment functionality facilitating the creation of the complete engine.

DESCRIPTION OF THE AHEILOS WORLD

Map of the *Aheil*os world:

*Aheil*os 1 region (+) - social interaction forum,
*Aheil*os 2 region (Δ) – didactic activity area,
*Aheil*os 3-5 regions (E) – areas with exposition profile,
*Aheil*os 6 region (Δ) – didactic area, lectures,
*Aheil*os 7 region (I) – project presentation area,
*Aheil*os 8 region (EP) – presentation area,
*Aheil*os 9 region (Π) – area for artistic experimentation,
*Aheil*os 10 region ($\Delta\Delta$) – model of the project
 “Architecture in the space of information.”

Idea of the *Aheil*os world

*Aheil*os is a project of virtual interactive spatial environment for the purpose of artistic, educational and social interaction project implementation. The aim of this project is to create an environment available for artists that will give the possibility of exchanging ideas based on the specifics of architectural virtual space. The basic structure of the *Aheil*os world is area defined in metrical units associated with human scale represented by avatars. The space in urban scale is divided to regions. A single region represents spatially an area of 65 000 m². Currently there are 10 regions launched (*Aheil*os 1-10) with a functional diversity, that offers 650 000 m² of area for development. The *Aheil*os world allows modeling of spatial forms, applying textures and colors, filling the forms with multimedia content, two sided content streaming with the outside world, physics and natural environment simulation, defining interactions, and object behavior by scripting. The environment development was based on an open-source engine – OpenSimulator, equipped with a database and configured for online functioning by the New World Studio software. The idea assumes expansion of the *Aheil*os world by adding new regions according to the needs of content and population capacity. [6] It also assumes connecting *Aheil*os to the global virtual worlds network – the Hypergrid. [7] Some aspects of functionality of the OpenSimulator environment were shown in my Ph.D. dissertation in 2008: “Models of architecture in the space of information.” A single region model focused on the potential of the interactive 3D environment to deliver information content. For this purpose it was filled with content presenting the written part of the dissertation in the form of interactive multimedia spatial installation. The dissertation model is available for exploration as content of the *Aheil*os 10 region. The next step on the way to developing the *Aheil*os world was the project “AS metaverse,” created in 2011, in which the online functionality of the OpenSimulator environment with multiple remote users was tested. For the purpose of that project one region sized model of White Eagle Square in Szczecin was created. The effect of work at that stage is the *Aheil*os 1 region, profiled for social interaction. *Aheil*os world is an open

project continuously filled with content profiled for art and artistic education. There are currently over 100 users registered in the system and 7 of 10 regions more or less filled with content. The following pages of this paper will present all specific regions currently functioning in the *Aheil*os world along with the hosted projects. Up to date information about ongoing events taking part in the *Aheil*os world, video tutorials and timeline are available on the YouTube channel and Facebook profile. [8-10]

Functionality overview of selected regions

*Aheil*os 1 region (+)

*Aheil*os 1 region has by assumption a social interactions profile. The presented spatial model is a copy of White Eagle Square in Szczecin. The first illustration (Fig. 1) shows the Palace under the Globe – the main location of the Academy of Art in Szczecin. In the second illustration (Fig. 2) the representative fountain is visible, flanked by the Palace Under the Globe and a building previously occupied by Polmozbyt, with the St. Jacob Cathedral in the background. This square is a place to which all the new users are coming with the first login.



Fig. 1. *Aheil*os 1 region. Palace Under the Globe.



Fig. 2. *Aheil*os 1 region. White Eagle Square.

There is an information point here and a teleporter allowing rapid movement to all other nine regions. In the information point there is a possibility to enter the website of the project and the login page associated with the up to date statistics associated with

the *Aheilios* world functionality. There is a special area behind the Polmozbyt building dedicated to users that are not land owners for testing advanced modeling, physics simulation and scripting functions without restrictions. One of the effects of such experimentation is a large monument dominating above the area with its form evolving from time to time by the actions of new users. The *Aheilios 1* region was developed in 2011 as part of "Metaverse AS" project for the purpose of testing the online functionality of the OpenSimulator platform with the online presence of many users. After successful tests it was included in the *Aheilios* world as a socially profiled starting region, becoming a kind of bridge between the real and the virtual for the users of White Eagle square public space. Objects included here are in the constant modeling process. There also will be some of the interior spaces included in the project in the later stages of development. As an example of such actions, the hall of the Academy of Art main building can be viewed, which is already in the modeling process. The *Aheilios* world is by assumption an open project that can evolve in several directions according to actual needs. Region , that is largely part of the city mockup, could potentially acquire functionality connected to urban public space with informative, promotional, urban planning or architectural design functionality and could evolve by other regions representing the larger part of the city. There is currently a debate in Szczecin about possible design solutions concerning the revitalization of the White Eagle Square space. The model in *Aheilios 1* region could be used for verification of the planned solutions in the simulated virtual reality environment. Currently *Aheilios 1* region is undergoing a redesign to become a reconstruction of the White Eagle Square in its form from the year 1938 (Fig. 3). There are also a few teleporters added near the St. Jacob Cathedral with destinations to other educational regions in the Hypergrid network (Fig. 4)



Fig. 3. *Aheilios 1* region. White Eagle Square, 1938.

Aheilios 2 region is by assumption an educational activity zone. Starting in the summer semester of the academic year 2012/2013, the Exhibition design workshop of the Academy of Art in Szczecin is performing courses utilizing this environment. Two projects took part here in the summer semester: *Spatial poster* and *Trade stand*.

The first subject was about making a spatial interpretation of an idea behind the selected poster in the form of a small architectural structure in the context of a closed public space. The aim of the second project was to design a *trade stand* for the selected company, product or event in the context of assigned space in a typical trade hall. For the purpose of these courses models of a trade hall and a trade center were created with the intention of simulating the conditions typical of such objects functioning in real environment. Realization of the tasks by the use of this new tool was not obligatory and created the greatest interest amongst the students of the 1st year. Generally there were 14 projects developed with the use of the *Aheilios* world space in the summer semester – 11 of them with the subject of *Spatial poster* and 3 considering the *Trade stand*. The remaining works were developed by utilizing standard



Fig. 4. *Aheilios 1* region. Hypergrid teleporters.

Aheilios 2 region (Δ)

CAD tools and included posters in the end of the year exhibition that took place in the second half of June, in real world and in *Aheilios 2* region of the virtual world simultaneously. The model of the trade center is located in the upper part of the region. The object was divided functionally to store spaces and shopping malls, which were the context for the project task developed in the 1st year's course. A 16m wide mall was divided into 28 sections of 16x16m and an area 256m² each. Every student had to choose one of these locations for the development of his project. After assigning the locations students gained full rights for content development within their own area. The trade hall is located in the lower right part of the region. Inside the hall there is a communication area and technical area and fields assigned for *trade stands*, most of them with dimensions 12 (or 16 if the math is going to work) x16 m and area of 256 m². These fields were distributed amongst the students that were designing their *trade stands*.

There is a wide range of new possibilities and tools for didactical work offered by the *Aheilios* environment for teaching architectural design. The possibility of simulating design context is one of these assets. The advantages of CAD tools are expanded by the in-world

factors of immersion, remote team work, remote consultations (e-learning) by utilizing built-in tools for text communication, voice communication and multimedia. By telepresence the process of design work is a subject of continuous dynamical verification in reference to scale, human presence and context. Handling multimedia content, introducing interaction and variable properties of objects by scripts gives the possibility of simulating dynamic changes, such as changes of lighting or impact of spaces utilizing led systems, projections and sounds. All these assets can be used for remote presentation of the project, highly altering the capabilities of traditional transmission techniques.

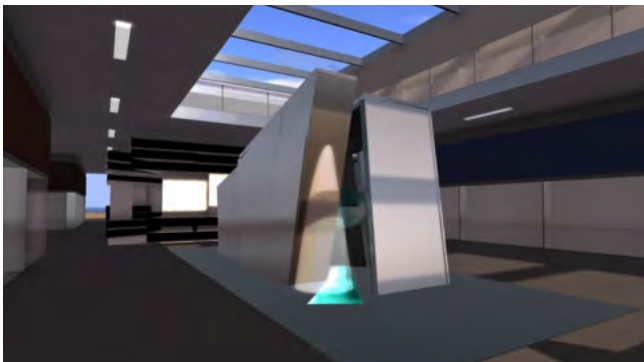


Fig. 5. *Aheilios 2* region. *Spatial poster*. Students project at trade center. Author: Joanna Roguszcak.

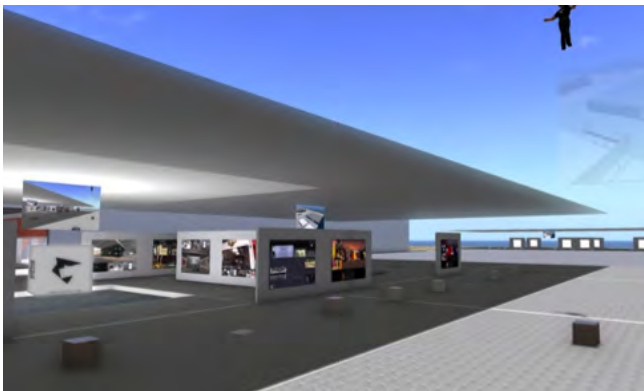


Fig. 6. *Aheilios 2* region. End of the year students' exhibition.

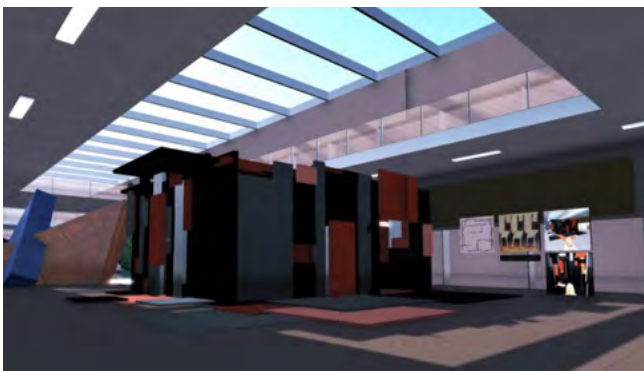


Fig. 7. *Aheilios 2* region. *Spatial poster*. Students project at trade center. Author: Monika Delik.

Aheilios 2 region was also hosting the end of the year 2012/2013 exhibition of the Exhibition Design Workshop II and Visual Identity Design Workshop. Projects developed in the *Aheilios* environment as well as other projects developed with traditional techniques were showcased on exposition boards arranged in the middle part of the region, between the two halls. This event took place on 15 July, 2013 in the wider context of the first edition of "Cubetura" student's architectural design triennial in Szczecin. During the opening of the festival the capability of two-way content streaming of the *Aheilios* platform allowed live communication and visual contact between quests in the virtual and the real world.



Fig. 8. *Aheilios 2* region. Trade hall.

Aheilios 3 region (E)

Aheilios 3 is one of the areas profiled for exhibition purposes. The difference between this region and the other exposition areas is the assumption that periodic exhibitions, also those associated with parallel real live events, will take place here. After content replacement the exhibitions are moved to *Aheilios 4* region, where they are available for exploration as a form of 3D archive. *Aheilios 3* region functionality was inaugurated between January and February 2013 with Witold Gawłowicz poster exhibition. In the period of 16.03 - 10.04.2013 an exhibition "*Aheilios* – creation and education in the space of information" took part simultaneously in Delta Club – a branch of City Cultural Center in Szczecin and the *Aheilios 3* region. The opening event took part simultaneously in the two spaces, allowing real or virtual presence (with avatar). The guests on both sides had continuous live visual and sonic contact allowed by the two-way content streaming ability of the *Aheilios* platform. In *Aheilios 3* region a big screen was located with live streaming from cinema interior of the Delta Club. The comments made by real space visitors could also be heard in-world. Real space visitors had the same opportunity to see what was happening in the *Aheilios* space, hear the virtual spectators speaking and read their messages on the big screen in the cinema room. Guests represented by avatars could fully participate in the discussion in real time. The subject of this exhibition was two parallel impressions about the structure of information in real and virtual world.

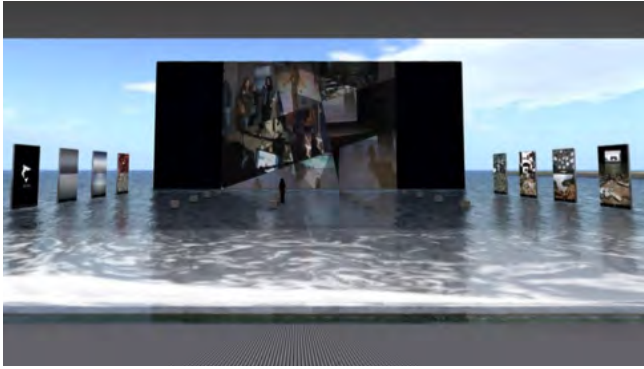


Fig. 9. *Aheilios 3* region. Exhibition: *Aheilios* - creation and education in the space of information.



Fig. 10. Exhibition: *Aheilios* - creation and education in the space of information. Cinema room.

14 km North-West from the Ancient Corinth, alongside the Corinthian Gulf, over a small cove surrounded by steep rocks, lies the Temple of Hera Akraia in Perahora. It was the location of a cult from the 9th century BC to 146 BC, when the Roman general Mummius conquered Corinth during a war with the Achaean League. According to Euripides' texts, Medea buried her murdered children here after her escape from Corinth. In the surroundings of the temple there are many excavations from Neolithic, early-Hellenic and Mycenaean eras. Probably somewhere here was the location of the ancient city Heraion. From the earliest times to the current days this area was densely urbanized. In ancient times, in a relatively short period of time and in a small area, there was a great cultural bloom happening, creating the ideological base for the construction of western civilization. Ideas that then harmonically built the overall picture of the world have survived to our times as a group of fragments deconstructed in time and often mixed with other cultural influences and reassembled in another manner. The inhabitants of these areas were always accompanied by the sea. The coast neighboring with the Temple of Hera is rich in stone beaches, where many interesting stone specimens of unusual shapes and colors can be found. Examples of such stones could be seen during the exhibition at the Delta Club.



Fig. 11. Rhizome interior at *Aheilios 10* region. Part of an exhibition poster.

Virtual world is built with information. The value of the information is determined by the structure of its arrangement in association with users perception capabilities. Humans natural environment is the interactive real space and the interaction with it is happening by the mediation of senses. The formal concept of the exhibition was to show analogies of information in the digital space with pictures recalling the once harmonic and now deconstructed structure of European civilization. The idea was a try for a different approach to the stones from Corinthian Gulf as a source of disordered information about our culture, that we can someday reassemble and absorb along with science development.



Fig. 12. Temple of Hera Akraia in Perahora at the Corinthian Gulf. Part of an exhibition poster.

The virtual part of the exhibition was built on water, which is the initial state of the platform – before regions emerge there is only sea. The sea is also a motif connecting the two parallel impressions. Space arrangement referring to cinema resulted from the main functional assumption of the exposition – existing on the edge of the real and the virtual, where the projection screen was the linking element of these two spaces.

Aheilios 4 region (E)

This area is profiled for permanent exhibitions and archiving periodic exhibitions that previously took part in *Aheilios 3* region. The space has been initially divided to 640m² plots adjacent to a few squares and communication passages to the neighboring

regions. Currently there are three locations functioning here: Leszek Zebrowski, Ireneusz Kuriata and Witold Gawłowicz poster galleries. In the future the other plots will be distributed between users with the aim to develop individual exposition concepts. The lower part of the region hosts the first launched object – poster gallery of Ireneusz Kuriata. The form of this gallery emerged after consulting the author, who needed for the purpose of his exhibition a one store hall divided in two inner spaces and an outside area with a billboard holder emphasizing the entrance area. Such type of object was then approved for the next two exhibition areas. By entering inside the gallery we have the possibility to explore the newest creations of the artist, that have been presented on his two last exhibitions in Brama Jazz Cafe and Delta Club in Szczecin and also his older works. The posters of Ireneusz Kuriata can be characterized as simple and synthetic in form and their subjects are oscillating around music. The author is a supporter of a so called “self edition” creation and most of his works were developed as autonomous creations. In his work he mainly operates with forms of sign and self-developed typography which are communicating the content in a simple way. This approach is clearly visible in the last series of works called “Audiopiktofilia.” The latest research of the artist shows an animated sonic poster that is located in the exterior area in the form of an animated billboard. *Aheilios* virtual environment has made it possible to simulate solutions offered by contemporary public space that introduced the technology of led displays that are liberating the poster from its traditional medium in favor of dynamic multimedia solutions.



Fig. 13. *Aheilios 4* region. Poster gallery of Ireneusz Kuriata.

The next object already functioning in this region is the poster gallery of Leszek Zebrowski. The rich portfolio of the artist is mainly connected with cultural issues – theatre, music, opera, film and cultural events. His works are characterized by recognizable individual style based on manual illustration techniques and self-developed typography. Leszek Zebrowski is classified as the middle generation of Polish poster artists and continuously present in art from a few decades with a portfolio of over 350 posters. This is a unique exhibition for a few reasons. The work of Leszek Zebrowski is part of the most-recognized Polish poster history and the context of exhibition in the *Aheilios* world connects this history with new technologies of art exposition. The second great value is

the selection of works, which are characterized by subjects and a formal approach away from the main stream of artist's creation and they were never published before. The *Aheilios 4* region exhibition is the premiere presentation of these selected works.

By moving forward towards the region's center we can explore the poster gallery of Witold Gawłowicz. His artistic research is most often characterized by the use of photography, sign and typography. Poster concepts are developed based on a simple and accurate idea that in connection with a professional workshop is making a strong impact on the spectator. The artist is a winner of many prizes and many of the posters presented here are functioning in the public space and publications associated with art and culture.

Aheilios 7 region (I)

This area is dedicated to virtual aid for projects developed in the real world. On the current stage there are three projects located here: concept of a modular system of prefabricated floating houses, project of a seasonal house and a model of Delta Club exposition interior arranged with an exhibition.



Fig. 14. *Aheilios 7* region. Model of seasonal house.

The seasonal house model is located in the lower part of the region. The local development plan strictly defined the maximum building surface (75m²), the height (7m) and the roof geometry (gable roof). The goal was to create the most simple form complying with these restrictions. The object was slightly offset from the center of the plot. Single space with daily functions of the ground floor is open to the garden in both directions. Similar terrace and natural lighting layout was adopted on the attic floor, where night functions were located. The main door leading to the hall and the other leading to the kitchen were set on the side area of the plot, where the parking area for two cars is also located. The emerged model was used for consulting the form of the object and the functional plan with the client. In the central part of the region a mock-up of the exhibition interior of the Delta Club is located. This model was used for creating the initial concept of space arrangement for the exhibition “*Aheilios* – creation and education in the space of information” that allowed it to noticeably

shorten the exhibition installation process, because the effect of work on the model accurately simulated the real conditions of the location. The upper part of the region was arranged with the project of modular floating houses. Project guidelines assumed the creation of a system of prefabricated residential objects with a few functional options, based on ready modular 10 x 2,5m floats that could be joined in larger blocks. Such sizes of the elements allowed their transport by road on typical trucks. For initial project needs, three basic functional options emerged based on two or three float module combinations and a few sub-options with slight functional modifications. The form of these objects was inspired by small floating units. Each of these objects was designed as single story with a terrace on the roof top. The two float options were designed to accommodate two persons and the three floats option was considered for a family of four persons. The project was consulted remotely with the client in the *Aheilios* world during the concept phase work.

The ability of remote presence and interaction in 3D space opens new perspectives for remote teamwork and presentation of architectural designs. The advantages of virtual environment in this range should not be underestimated by architectural offices, developers, real estate dealers, the hotel business and all the other services associated with architectural space. Amongst the potential implementations of the virtual space in this context are the possibilities of exploring and furnishing an apartment before purchase, exploring a hotel before making a reservation, remote presentation of projects, consultations with clients or partners in distant locations and initial arrangement of exposition areas. Following that track, many more examples of utilizing the virtual architectural space for enhancing the service sector in the real world can be mentioned.

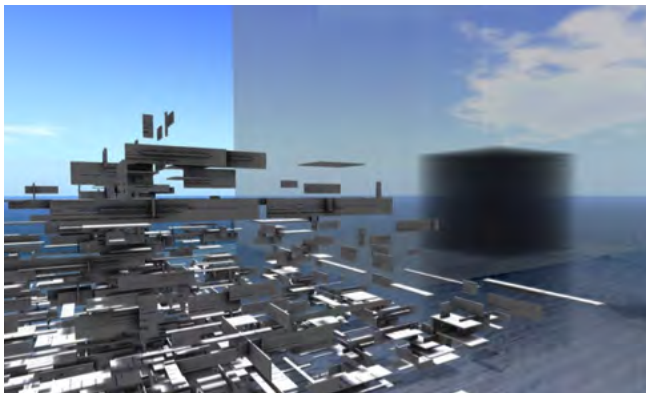


Fig. 15. *Aheilios* 9 region. Multimedia structure and light tracer.

Aheilios 9 region (Π).

This is a zone for artistic activities experimenting with the nature of the *Aheilios* virtual world, which is created out of information shaped as spatial forms, colors, textures, sounds, films, interaction. The built-in script language gives freedom in designing objects behavior which allows the development of complicated project concepts.

There are currently two installations functioning in this region: cinematic spatial multimedia structure and light movement detector.

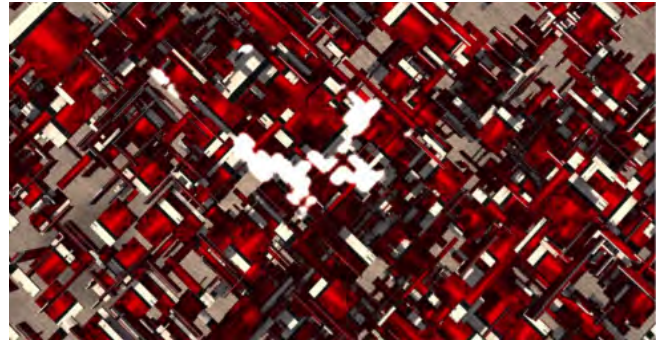


Fig. 16. *Aheilios* 9 region. Multimedia structure from above.

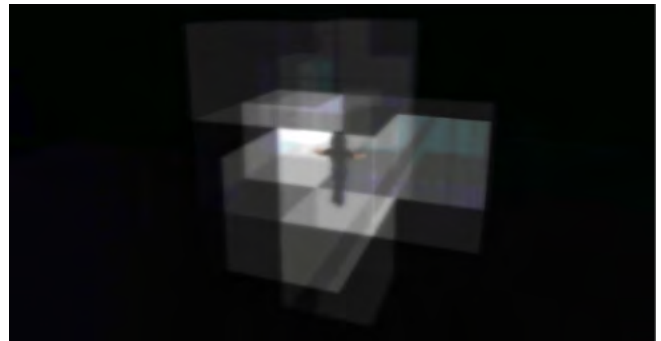


Fig. 17. *Aheilios* 9 region. Inside the light tracer.

The middle part of the region is built-up with an abstract spatial structure made out of a few thousand blocks of different sizes and proportions. The structure is sparse outside and concentrated towards the central area. All the objects have the "Phantom" property assigned that eliminates collisions and allows free movement of the avatar in all directions. Dark coating of the objects was defined as multimedia texture. When someone is entering the structure a projection of "3D structures" animation is initialized on all surfaces. The user finds himself moving through space built-up out of film and generating frames dynamically from this spatial installation.

In the upper left part of the region there is an installation called *Light traces*. It is a spatial interactive matrix built-up from a few thousand transparent cubes with a property of light detector scripted and nested in each object. The elements of this matrix are analyzing the space in a 3 meter radius in 5 second time intervals searching for an avatar nearby. In case of detection the element switches on as a light source. In the next cycle the detection is limited to a 2 meter radius and if there is no avatar present in that range the intensity of the light decreases by half. If the avatar is not detected nearby in the 3rd cycle – the light source will turn off. By moving in the field of detectors the user generates light traces in the structure that are fading away in time. Below is the script that is the key element of the installation.



Fig. 18. *Aheilos* 9 region. Inside the multimedia structure.

```
// Simple script for turning the light source in an object
// on
// and off by detecting movement of nearby avatars.
// The default state of the object that is defined here
// default
{
  // Here begins the action launched immediately after the
  // state "default" starts.
  state_entry()
  {
    llSetPrimitiveParams([PRIM_TEXTURE,ALL_SIDES,
    TEXTURE_BLANK, <1.0, 1.0, 1.0>, <0.0, 0.0, 0.0>,
    0.0]); // This function is removing the texture from the
    // object in if any is applied.
    state dark; // Redirecting to the state "dark."
  }
}
// The state defining the parameters of the object
// simulating a turned off light source starts here.
state dark
{
  // Here begins the action launched immediately after the
  // state "dark" starts.
  state_entry()
  {
    llSetPrimitiveParams([PRIM_COLOR, ALL_SIDES,
    <0.0,0.0,0.0>, 0.1, PRIM_FULLBRIGHT, ALL_SIDES,
    FALSE, PRIM_POINT_LIGHT, FALSE,<1.0,1.0,1.0>,
    1.0, 20.0, 1.0, PRIM_GLOW, ALL_SIDES, 0.0]); // This
    // function is turning off the light source in the object.
    llSensorRepeat(", " ", AGENT_BY_LEGACY_NAME,
    3.0, PI, 5.0); // This function is launching the detection
    // of avatars within a radius of 3 meters in 5 seconds
    // time intervals.
  }
  // Here starts the event launched after avatar is detected.
  sensor (integer how_many)
  {
    state light; // Redirecting to "light" state.
  }
}
```

```
}
}
// The state defining the parameters of the object
// simulating a turned on light source starts here.
state light
{
  // Here begins the action launched immediately after the
  // state "light" starts.
  state_entry()
  {
    llSetPrimitiveParams([PRIM_COLOR, ALL_SIDES,
    <1.0,1.0,1.0>, 0.1, PRIM_FULLBRIGHT, ALL_SIDES,
    TRUE, PRIM_POINT_LIGHT, TRUE, <1.0,1.0,1.0>,
    1.0, 20.0, 1.0, PRIM_GLOW, ALL_SIDES, 0.2]);
    // The above function is turning on the light source in
    // the object.
    llSensorRepeat(", " ", AGENT_BY_LEGACY_NAME,
    2.0, PI, 5.0); // This function is launching the detection
    // of avatars within a radius of 2 meters in 5 seconds
    // time intervals.
  }
  // Here starts the event launched if no avatar is detected.
  no_sensor ()
  {
    state halfight; // Redirecting to "halfight" state.
  }
}
// The state defining the parameters of the object
// simulating a turned on reduced intensity light source
// starts here.
state halfight
{
  // Here begins the action launched immediately after the
  // state "halfight" starts.
  state_entry()
  {
    llSetPrimitiveParams([PRIM_COLOR, ALL_SIDES,
    <0.5,0.5,0.5>, 0.1, PRIM_FULLBRIGHT, ALL_SIDES,
    TRUE, PRIM_POINT_LIGHT, TRUE, <1.0,1.0,1.0>,
    1.0, 20.0, 1.0, PRIM_GLOW, ALL_SIDES, 0.1]);
    // The above function is turning on the object as a light
    // source with half intensity.
    llSensorRepeat(", " ", AGENT_BY_LEGACY_NAME,
    2.0, PI, 5.0); // This function is launching the detection
    // of avatars within a radius of 2 meters in 5 seconds
    // time intervals.
  }
  // Here starts the event launched if no avatar is detected.
  no_sensor ()
  {
    state dark; // Redirecting to "dark" state.
  }
}
Object scripting allows the use of metaverse engine in a most
```

comprehensive way. There are many scripting resources available, even very complex, that are converting a single region in flight simulator, car racing simulator or an arcade game. [11-13] It is not difficult to imagine that such functionality can be applicable in professional simulations supporting various science disciplines or eventually in art, for designing interactive artistic installations for the real world or these functioning autonomously and experienced by the user in virtual 3D space.

Aheilios 10 region (ΔΔ)

The content of *Aheilios 10* region is a model of my doctoral dissertation from 2008, entitled *"Models of architecture in the space of information – based on examples of own works, the works of known theorists and practical implementations."* The work stated that teleinformation space is a new virgin field for architectural design, where its form and function is determined by the need of an interface for information flow. The aim of the architectural installation present in *Aheilios 10* region was to show the potential of this type of interface for transmitting information. The model located here is equivalent to the content of written dissertation. Chapters are reflected by urban structure of the model. Master plan including all thematic sections of the installation can be found in the starting point - inside the "Rhizome" object (Fig. 11). Sharing the model online was made possible through the *Aheilios* project. Detailed description of the content of *Aheilios 10* region is available in separate publication as mentioned above. [14]



Fig. 19. *Aheilios 10* region. Architecture in the space of information. Chapter 1.3. Historical overviewT



Fig. 20. *Aheilios 10* region. Scripted dynamical sculpture.

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BEAUTY AND CRITICISM IN PARTICIPATORY ART WORLDS

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ABSTRACT

This paper investigates whether interactive works of art that are judged beautiful can contain criticism and adopt a resistant position. Its empirical case is Benayoun's interactive piece *World Skin*, which deals with the media's involvement in modern warfare. The assumption is that the sentiment of participatory beauty is grounded in the pleasurable experience of agency as a feeling of unity and embedded-ness. Here also, potential criticism becomes an integrated part of the interaction system consumed by each (inter)action. The paper argues for a non-consumable rest that allows for felt criticism and cathartic beauty.

INTRODUCTION

In his short text *Digital Apparition* Flusser writes that the establishment of science in the wake of modernity favours the representation of the world by means of alphanumeric codes and algorithmic models at the expense of literal and pictorial representations. [1] He asserts that such models are models of 'alternative worlds.' In his understanding, the term alternative does not imply a difference to an original world, but rather refers to the fact that modernity consists of alphanumeric models that project worlds. Consequently, Flusser concludes that there are no longer any so-called objective criteria which we can employ to identify a truthful representation of reality (even though science and enlightenment wants us to believe just that); there are only calculated and operationalised models constructing reality. Yet, we need a criterion that allows us to judge which models fit and which do not, which are right and which are wrong. According to Flusser, this criterion can only be the aesthetic sentiment of beauty¹.

Furthermore, humans are inherent parts of these models. According to Flusser, we are but condensations of the numeric model and thus projections of alternative worlds. But this move complicates his thesis of beauty as a criterion of truthfulness; seemingly, only humans can endeavour to aesthetic taste. But when humans have become projections of the projected alternative worlds, then the sentiment of beauty has become an intrinsic part of the model too. The model seems to construct a sentiment of beauty. This would lead his theory into an infinite recursion, because even the sentiment of beauty no longer implies an external observational position and true values. This paper intends to reflect on this problem by restricting its field of investigation to participatory² electronic art (represented by one specific case) that can be said to construct fictitious yet real worlds³ of palpable interaction on the basis of algorithmic models and by asking whether participatory art intends to construct a specific sentiment of beauty at the expense of the artwork's critical potential. On the face of it, the criticism assumes an external observational position that is able to contextualise a particular artwork within a wider framework. Contrarily, the sentiment of beauty emanates and expresses a feeling of unity and redemption.

WORLD SKIN

My case is Maurice Benayoun's interactive art installation *World Skin*. [2] Even though the piece is almost twenty years old and thus not exactly state of art in terms of technology, video resolution, hardware acceleration etc., the piece consists of participatory elements in a (re)presented media world. Thematically, the piece discusses the effect that (interactive) media has on our perception of reality by doubling the existing media processes such as live transmissions of a battlefield. The piece is a CAVE installation depicting a photographic image of a modern war scenario on all four walls. The pictures are black and white and comprise of two-dimensional figures and objects (reminiscent of cardboard figures) within quite a dark, desert-like landscape. Participants enter the CAVE as a group; they are each equipped with a digital camera and one member of the group also has a navigation device that allows panning and zooming within the endless universe. The soundscape is dystrophic, drone-based and synthetic, alluding to machines and aircraft interrupted by heavy breathing. The participants can take photos with their devices. Each click erases a rectangular part of the picture leaving unclear silhouettes slowly fading away. Afterwards the photos that have been taken are printed and given to the participants as trophies.

On the face of it, this piece does not conjure the sentiment of beauty. War is a serious and ugly business and the artistic idea behind the piece seems more driven by criticism and critical investigations of news media. However, like dramatic tragedies can evoke cathartic beauty, I claim that this installation can elicit the sentiment of beauty. [3] How? And does the pleasurable sentiment of beauty annihilate the critical intention of the piece? Let me first explain my notion of beauty in participatory art.

BEAUTIFUL EXPERIENCES IN PARTICIPATORY ART

Participatory works of art can be understood as interaction systems that engage the participants from at least three perspectives: sense perception, agency and cognitive realization of the agential possibilities and artistic concept. [4], [5] Broadly speaking, the first two perspectives create the feeling of realness; the third perspective (cognitive realization) determines sense perception and agency as fictitious, as part of an overtly constructed world. I claim that participatory works of art can only be experienced as beautiful, if the sentiment of beauty is tightly connected to the participant's actions⁴. The sentiment of beauty must here be understood as a sensory objectification of an operational system's coherence between its constituents and actants (including the participant). Beauty designates experienced coherence that involves sense perception, the modus and quality of agency and the cognitive realization of the operational system's discourse (its interaction mechanics, its means and aims). Beauty is thus a sentiment that emerges, when sense perception and agential participation yield conceptual realizations and when

conceptual realizations feed into concrete interactions. Bluntly, beautiful experiences of participation tell us about the feeling of integrated-ness (or disintegrated-ness) in participatory works of art.

Furthermore, I claim that participation can only be experienced as beautiful because of the indeterminacy that identifies participatory artifacts as enacted – yet fictitious – alternative worlds. Expressed concretely, the paradoxical precondition for the sentiment of beauty is realizing the world of the artwork as being a possible world that is enacted as an actual world.[6] In this sense, art shows that the world in modernity is an alternative world or that it could be different. [7] The world appears (*Erscheinen*) through agency and sense perception as an act of creation. Its appearance is the very source of the sentiment of beauty (however, appearance elicits the sentiment of beauty). Yet, the sentiment of beauty manifests itself as the reflective realization of appearance (*Schein*). Beauty in participatory culture emerges in and as an act. Evidently, this needs further explanation.

BEAUTIFUL EXPERIENCES OF ACTS

Because recipient acts constitute the very foundation of participatory artifacts, it seems reasonable to make actions and acts the focal point of an investigation of beauty and beautiful experiences. In my book, I scrutinise the above-mentioned three dimensions of actions (the visceral dimension of perception and proprioception, the agential dimension of 'to act,' and the reflective dimension of contextualisation) [5]. I claim that the experience of beauty or better beautiful experiences synthesises the three dimensions into one significant act that conveys a feeling of unity⁵. Participation renders meaning and meaning feeds into participatory acts. But how can the emergent act yield the alleged feeling of beauty and what kind of unity is this act producing? Let me begin with the latter question.

APPROPRIATION ACTS OF PARTICIPATORY ART

As already mentioned, participatory artworks – and in a wider context, all participatory cultural artifacts – are constructed social scenarios that specify and frame their partakers, modes of interaction and quantity and quality of interaction. Elsewhere, I have elaborated on interactive art in depth as fictitious as-if autopoietic "interaction systems." [4], [5], [8] According to Luhmann, interaction systems come into operation due to the participants' realization of mutual observations. In contrast to interpersonal interaction systems, participatory works of art are conceptually preconceived and their interaction mechanisms are more or less predetermined; participatory artworks are either allopoeitic systems overtly pretending to be an emergent (self-sustaining) interaction system or intentionally framed autopoietic interaction systems.

World Skin establishes an as-if interaction system, not because the participant can navigate the virtual space, but because the virtual space consists of pictures of human persons, soldiers and victims. Depending on the degree of immersion, the participant

forms an intrinsic part of the scenario and thus relates to the depicted persons as a kind of proto-interaction. Surely, shooting photos of already mediated objects (making a photo of a photo) distances the participant further from an imagined realness of the scenario; the piece however is based on the concept of the imaginary realness of transmitted worlds: wars causing human sufferings exist for real out there, beyond the walls of the CAVE. A double-mediation sets the participant free to accept the referential status of the pictures. The as-if autopoietic interaction system of *World Skin* is an imaginary interaction system without factual interaction (in Luhmann's sense of observed observation). However, there is another; an autopoietic interaction system at play brought about by the reciprocal observations of the group of participants. This interaction system potentially plays out on several levels: the participants can, for example, observe body language and form theory of mind abductions of the other participants' intentionality and, of course, engage in explicit, verbal communication.

Participatory artifacts seen as interaction systems distribute agency among the partakers. By means of inherent interaction mechanisms, the system determines how, when and where the participant can interact. Of course, the participants can do what they want, but if the undertaken actions should make sense and create meaning within the framework of the artwork, then the conceptually determined interaction mechanisms must be respected or somehow taken into consideration. Participation in this sense bears an affinity with playing in that participatory art as play unfolds within a 'by the artist' defined structure (e.g. rules). Playing means to be "transformed into a structure." [9] The participant is thus "being played." [Ibid.] In this sense, a participatory work of art appropriates the partaking subject by delegating agency. [10] Appropriation is self-transcendence that yields a "one-another-ness" ('das Einander'; Gadamer, cited in [11]) a neologism that expresses the simultaneity of being oneself and being part of something else, here, of the as-if interaction system. Expressed more prosaically, the participant willingly plays a role or fulfills a function.

ART GEBILDE

Participatory art can only be realized as works (of art), if the participant sees his or her actions as part of a structure that the participant is an intrinsic part of and yet can be observed and realized as artifactual or, better, as performative *Gebilde*. [9] Gadamer's term *Gebilde* "allows him to play on the capacity of art to be both a work (ergon) and work (energeia), just as *Spiel* is both play and a play." [12] A participatory *Gebilde* (ergon) has thus to be realized (instantiated) with each (inter)action. This is not (solely) a cognitive hermeneutic endeavour, but foremost a performative one. The participant initiates the work of art. The work of art as performative *Gebilde* constitutes the conceptual and agential framework without which a participatory act could not be recognized. In fact, the participatory work of art creates acts that are effectuated and realized by human participants. The

participatory *Gebilde* defines an act as a unity that, firstly, elicits mutual observations, secondly, creates the possibility for continuation of the artwork and thirdly, is furthermore a token of an artwork's particularity in terms of interaction mechanics (the social dimension), subject field (the thematic dimension) and its dramaturgy (the time dimension).

For the participants in *World Skin*, an act is most likely made up of photo shootings as a prolongation of observations (or for the one navigating the space, the act of navigating). Possible interactions between the participants are acts too, yet they do not concern the interaction mechanism directly, but are most likely comments dealing, for example, with thematic or aesthetic issues, interaction mechanics or dramaturgy. Furthermore, participation also has to be understood as acts of an entire group of people, not solely of individuals. A group of participants are performing war tourism. Evidently, interactions between the participants could also deal with completely different issues beyond the thematic framework of the artwork, such as discussions about personal, private or political matters. The participants could also dance, jump or do other things. In those cases, the depicted virtual world would frame all imaginable actions in such a way that the war scenario would be a comment on the action within the CAVE and vice versa.

At any rate, the specific constituents of what composes an act cannot be determined beforehand, but only through experimental participation yielding a bodily anchored understanding of the artwork's particularity. Expressed differently, only the art *Gebilde* as an enacted oscillation between action (*energeia*) and the conceptual blueprint (*ergon*) can determine an act. This oscillation incorporates and negotiates distributed agency, the cognitive conceptual realization and the sensory qualities of perception and proprioception.

MEANING-MAKING AND BEAUTY

Now, beautiful acts must have something to do with the experience of the flow propelled by this oscillation yielding an emergent feeling of unity between the participant and the work of art. As already pointed out, in participatory art, the art recipient is both an inherent part of the *Gebilde* (which includes his or her own actions) and a distant onlooker to the occurrences while being in the middle of the action. Being part of the artwork, an act has to make sense within the set discourse of the piece. Sense (German *Sinn*) is defined here as the difference between actualization and potentiality. [13] Each participatory work of art has to offer potential interactions that the participant might actualize. This difference spurs an active search for possibilities to (inter)act that assures the continuation of participation (and thus of the artwork). Acts that yield the continuation of participation create a feeling of continuance. Experiencing continuance must be considered the very basis for beautiful experiences because it palpably proves the coherence between a conceptual soundness and the participant's actualization of the piece⁶.

In contrast to Csikszentmihalyi's psychological notion of flow, participatory continuance is not a totally immersive experience that intends to annihilate the subject's self-awareness. The role of the participant must also entail reflective observations (second order observations). Participatory art (in contrast to, for example, games) is especially proficient in working with an 'internalized spectator,' a kind of cognitively constructed viewpoint from which one can witness the occurrence while partaking. [14] The internalized spectator uses each (inter)action to detangle the conceptual dimensions of the art piece in question. The participant scrutinizes the artwork's possible meanings (interpretations) while or rather through partaking (in this case interacting).

Meaning-making in art can be understood as a Peircean recursive process of referencing: the interpreter experiences a work of art and its constituents as sign(s) that refer to something (object, context, theme, feeling, itself, etc.) thereby creating significances on various strata such as personal, societal, cultural or political ones. A piece might be significant for an individual participant because it might touch the subject thematically – it might, for example, comment on societal, political or media conditions as the piece *World Skin* does – and aesthetically by yielding associations and moods. In participatory art, the generated meanings are subsequently fed into the continuous unfolding of the piece in question. The perpetual meaning-making has an influence on how the participant is interacting.

Evidently, the potential meanings of *World Skin* are to be found through the act of (photo) shooting and deleting depicted soldiers and victims with a camera within an immersive and mediated space. Not guns but media devices are killing. Baudrillard's much discussed assertion that the first Iraqi war was a media created simulacrum where military actions were undertakings devised for the media, comes to mind. Baudrillard acknowledges however that the atrocities masqueraded as war were real: people actually died, people actually lost their houses, people actually lost their livelihoods. Interacting with *World Skin*, meaning emerges in the interstice between and dependencies of two contexts: firstly, the participants' actions within the CAVE and, secondly, the scenario's referentiality. In this sense, meaning is not solely brought about hermeneutically but also performatively. Actions drive cognitive realizations and, in turn, cognitive realizations of the artwork's potential meanings convert actions into acts. Acts are thus performative tokens (objectivizations) of the embedded-ness of meaning-making in action. If this continuous transformation from the former to the latter (and vice versa) happens, the participants most likely experience the work of art as pleasurable and, according to my definition, as beautiful.

But what does that mean for the critical potential of participatory art in general and of the artwork *World Skin* in particular?

PERFORMATIVE BEAUTY AND CRITICISM

The coherent interdependence between interaction (*energeia*) and the capacity to be significant on various levels (*ergon*) appears to be a valid condition and index for beautiful experiences of acts, because the artifact seems to be 'fitted to attain its end' (or purpose), which is, first of all, to sustain meaningful participation. [15] The recursive-ness of agential engagement creates an operationally closed system. Meaning-making is produced and consumed by these operations. The pivotal question is whether beautiful acts also allow for a reflective dimension (the second order observation of the internalised spectator) that is not recursively included in the unfolding of the piece but remains as an inconsumable rest that could constitute a resident position. Concretely, does *World Skin* allow (or even sustain) the partaker's distancing reflection that transcends interaction mechanisms? Put the other way round, does *World Skin* unintentionally prevent the participant from a critical stance towards the shown atrocities by pointing out, firstly, the virtuality of media-made imagery and, secondly, including this in participant action?

The act of taking photos of representations of human suffering that includes cognitive realizations as, for example, ethical judgments, drives the piece. As a corollary, ethical judgments are converted into operative functions. A paradoxical situation emerges, where the feelings of disgust and aversion towards both war and the media are transformed into ideo-pleasures, the pleasure of conceptual understanding that (re-)assures our ethical standings and outweighs physical empathic reactions. [16] Analogous to Baudrillard's assertion, I could claim that the obvious critical intent of this piece has never been implemented, because the representation of real and media-constructed killings serves the purpose of participation.

In contrast to computer games or amusement parks that count themselves part of the entertainment industry without much critical intent, much art still caters to a resistant position of a kind, something that transcends mere consumption. Participatory art claims this position through the agential involvement of formerly passive onlookers. Performative engagement and lived experience should close the gap between mere cognitive realization and the incorporation of it into the fabric of life. However, this form of incorporation necessitates quite rigid participation mechanisms and scripts that do not allow for free interpretation (and unleashing of creativity). Bishop has described the fallacy of this artistic agenda seen in an art historical and cultural perspective. [17] I have described the complexity of this emancipatory agenda of participatory art by focusing on the systemic operations of these works of art that include play and game mechanisms. [4, 5, 18] *World Skin* takes over and simultaneously comments on adventure games mechanisms such as exploring (navigating), conquering (erasing parts of the landscape) and a reward system (shooting a photo is rewarded by the printed picture as a trophy). The piece remediates (computer) game mechanisms as it remediates the strategies of news media. By doing that it points towards its initial

distinction between so-called everyday life and the "play-ground" that allows, defines and terminates playful behaviour. [19] Even though *World Skin*'s playground is physically accentuated by the CAVE technology, this distinction can only be instantiated cognitively as motivational framing of occurrences. [20] Gadamer describes art as a serious play, because the playground and life are indissolubly intertwined without ever being the same. [21] This very distinction cuts through the operability of the piece and leaves the participant with a kind of guilt, not caused by having participated in the piece, but by having to participate in news medias' participation in wars. In fact, we are guilty of the impossibility not to participate in it (unless one retreats to a remote place without media access).

The piece *World Skin* is twenty years old and no longer exhibited, yet it is more relevant than ever. Today, IS (Islamic State) warriors serve a media purpose; it cannot be understood as an elimination of enemies. Reporters (and recently also citizens not involved in any way) are killed in order to produce specific media content that is directly shown or indirectly referred to on millions of media devices all over the world. The artifactual beauty produced by the artwork's coherence between thematic focus, conceptual operability and participant agency stands in stark contrast to the referenced world containing destruction, suffering and death.

CONCLUSION

This paper's premise is twofold: Firstly, our understanding of the world, be it on a scientific or on a layman's level, is based upon alphanumeric models that always render the world as an alternative world in which its evaluation in regard to its internal coherence and hence truthfulness can only be an aesthetic one. The modelled world includes the subject as a projection. Secondly, participatory art can harbour beautiful experiences of acts by creating a performative and reflective unity with(in) the work of art. [5] The pleasurable sentiment of beauty has become an intrinsic aspect of operational and instantiated models.

On the basis of these premises, the paper discusses the question of whether the sentiment of beauty in participatory art has become an operational means that counteracts and even annihilates (participatory) art's critical potential. Its empirical case is Benayoun's interactive piece *World Skin* dealing with the media's involvement in modern warfare. Every participatory piece must seek coherence between the participants' conceptual realizations and the expected agency. This pursued coherence secures the continuance of the piece and harbours potential beautiful experiences of acts. Consequently, the potential criticism of *World Skin* (and other participatory works of art) becomes an integrated part of the interaction system consumed by each act. However, participatory art, as all art, has to initiate a distinction between itself and its surrounding (normally termed everyday life). This distinction allows for a non-consumable rest, which in the case of *World Skin* can be felt as cathartic guilt and responsibility.

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ENDNOTES

1. The sentiment of beauty as an indicium of the real stands as a scientific fallacy though. In order to cover this up, one could speculate whether modernity brought about art by giving it specific societal functions namely the overt construction of imaginary, alternative worlds [22], be they pictorial representations, theatre plays or music arrangements. Now, the fictitiousness of the works of art defines the realness of the existing world. Because beauty has been seen as an aesthetic judgment closely connected to art (this is very evident during romanticism, see, for example, Bourdieu [23]), science could disregard aesthetic judgments and even reject them as unscientific in their endeavor to project and realize the world. However, the sentiment of beauty has played and is playing a decisive role in science. According to McAllister [24], the approval and hence truthfulness of scientific theories is based on aesthetics and specifically the sentiment of beauty. This proposition suspends modernity's distinction between the real and the imaginary world. In fact, this distinction has been a cover-up in that science has to be seen as (a kind of) art. [1]
2. These works of art are sometimes called do-it-yourself artworks [25], social aesthetics [26] participatory art (e.g., [27]), interactive art (e.g., [28]). Every one of these notions outlines specific features of audience inclusion into the very fabric of the work of art.
3. In this context, I define world as a temporary situation framed by an artistic script and unfolded by participant (inter)action.
4. In my book *Performing Beauty in Participatory Art and Culture* (2014), I develop a theory of beauty in participatory art. This paper relies on my findings presented in the book.
5. I preliminarily define participatory unity as the realization of an artwork's meaningfulness in the process of action.
6. Csikszentmihalyi has popularized the notion of flow as an immersive psychological quality in art. [28] In contrast, participatory flow is brought about by the operational appropriation of the partaking subject by the artwork as an interaction system. For a thorough argumentation chapter 5 in Heinrich. [5]

ISEA AND THE INTER-SOCIETY

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ABSTRACT

This short paper discusses the revival of the original aim of the ISEA symposium: the founding of a network organization for (what we now call) 'the emergent arts.'

INTRODUCTION

At ISEA2013 in Sydney a panel discussion was staged to reconsider the original aims of ISEA. The original aims had been strived after in the early years of ISEA, around 1990, but then they gradually faded into the background. This was marked by the decision, in 2006, to turn the originally founded association "ISEA, Inter-Society for the Electronic Arts," into the foundation "ISEA International." The title of the 2013 panel consequently was: "The Inter-Society for the Electronic Arts revived?." [1]

The name 'Inter-Society' perfectly reflects the original reasoning behind the organisation of the First International Symposium on Electronic Art, in 1988. The symposium was meant to assemble representatives of all kinds of organisations and institutes active on the emergent field of the 'electronic arts' and, from then on, to have them co-operate. Part of the felt need to start this co-operation was a feeling in those early days that may be less relevant today. It had become clear, in those years, that the traditional division of disciplines in the arts was rapidly becoming outdated through developments in electronic technology. The worlds of computer graphics and of computer music had not really met yet. The graphics people met at SIGGRAPH and the musicians met at the International Computer Music Conference (both as of 1974, co-incidentally). The first ISEA symposia were instrumental in bringing these worlds together. However, the need to have the organizations and institutes work together, with the Inter-Society as a structure to facilitate this, had a deeper grounding than the fact that the division of artistic disciplines had become old-fashioned.

CATAclysm

In 2013 I formulated this deeper grounded need as follows (in the shape of a 'Mini Manifesto'). [2]

- We live in a world that is governed by economic laws.
- Meanwhile, history is being governed by expansion of human knowledge, both encompassing insight and imagination or science and art, together known as culture.
- The development of science and its practical application, technology, is extremely fast, providing for rapid changes in production, medicine, social life etc.
- The economic motor requires us to consider every technological advance as a potential source of profit.
- This obscures our vision of future well-being on a global scale.
- In such a serious context, it is of essential importance that all artistic and creative initiatives that consciously aim at

grasping the implications of technological development, put their heads together and co-operate.

- The aim should be to structurally and systematically (in other words: *scientifically*) approach the artistic and creative potentials of our new age.

The main idea here is that the current state of science and technology is to a large degree beyond the grasp of non-experts. String theory is understood by laymen (like me) only in a very comprised, popularized way (let us say I can roughly follow Wikipedia's lemma) [3] and not in a way that would allow me to develop new insights based on it. In other words, for artists to work with the latest insights of scientists and on the frontiers of technology, it is essential they co-operate with scientists. The question is: how can we further this aim in a structural way? The answer to this question has been sought in the meeting of organisations of artists working with modern technology and organisations of scientists that are open to artistic thinking. Thus the idea of the Inter-Society.

Since the Inter-Society was founded in 1990, the number of organisations and institutes of artists that work with state of the art technology has at least quadrupled. The pressure for fundamental changes in society has increased simultaneously. To put it in the words of my late Indian teacher Ciranjiva Roy: The world is "running headlong for its inevitable cataclysm." [4]

PHILOSOPHY

In this paper I do not have the pretention to 'prove' that art and science need to cooperate in order to find ways out of the crisis the world is in. Authors much wiser than me have written about it. [5] Let us say, I am a believer. I believe emotion and rationality are two faculties of human consciousness and together they make a whole. Both science and art have been driven apart by history and they need each other to help us get out of the difficulties we have worked ourselves into.

However, in this context it may be worthwhile to point to the growing influence of so-called post-modernism in the social sciences, when the belief in Marxist analysis diminished after the 60's and 70's of the last century. The Frankfurter Schule was a very influential sociological movement originating in pre-WWII Germany and flourishing in the USA, where many of the protagonists (i.e. Adorno, Marcuse, Horkheimer) fled to, after the Nazis came into power. Like Marx, they based their thinking on the work of the phenomenologist thinker and dialectical theorist Georg Wilhelm Friedrich Hegel (1770-1831). In this vision, art plays an important ideological role. This role is, however, not always positive. There was a tendency among his followers to plead for 'ideologically correct art,' although Marcuse, for example,

recognised the 'autonomy' of the art experience as a way to understand truth via emotions. [6] In general, the 'Frankfurters' agreed on a very negative influence they attributed to popular culture – in their view sharply distinguishable from 'high' art.

In the social and cultural sciences this vision lost power to the dominantly French school of postmodernism. Via intermediaries such as Roland Barthes, who analysed popular culture as the hidden (or tacit) expression of an ideology supporting capitalism, the attention shifted to thinkers like Baudrillard, Derrida and Foucault. They took the ideological analysis a step further; as it were from the idealism of Hegel to the cultural pessimism of Nietzsche. According to the post-modernists, all culture consists of signs and that includes both art and science. The very language in which social scientists or philosophers describe reality is ideologically coloured. This has a self-destructive aspect, because it invites us to analyse the language in which an argument or a theory is formulated or even 'proven,' and to not deal with the theory itself. It takes us away from what is being communicated and concentrates on how it is communicated. [7] That means that the postmodern philosophy itself is doomed to disappear because the only thing that should interest us, according to its ethos, is *how* it is communicated.

At the same time the destructive aspect of post-modernism has a creative result. The 'method' for post-modernist analysis is called 'deconstruction.' If social reality is a (social) construction, [8] we need to *de-construct* this reality in order to understand it and change it. A consequence of this way of thinking is seen in efforts by researchers to escape from the harness of the normally used languages (and methods) and look for new ways to research and describe reality. This develops into *artistic approaches to science*. In an ISEA2004 paper Finnish researcher Jussi Jauhiainen suggested, if I understood what he was saying correctly, that we could analyse (changing) cityscapes through *dance!* [9]

In line with this development, Dutch art schools, that in the past were sometimes connected to vocational technical education, but never to education at the level of the university, nowadays need to enter into 'academic research.' This is part of a wider movement, stimulated by the Dutch government, to connect vocational higher education to scientific research. To this end, academic researchers, called Lectors, are connected to (i.e.) the art schools. They are supposed to help the teaching staff to become (academic) researchers. I have witnessed rather confusing discussions between lectors and art school teachers, usually practicing artists themselves. The artists/teachers maintained that a substantial part of their art practice consisted of research already. There was clearly a meeting going on between the artistic and the academic definitions of 'research.'

The above is the result of "Bologna," or more correct "the Bologna Accords, a series of ministerial meetings and agreements between European countries," a "process [that] has created the European

Higher Education Area." [10] The Bologna Covenant implied the introduction, in practically all European countries, of the Anglo-Saxon bachelor-master system. [11] This is a very important development for anyone interested in the co-operation between art and science in general and for ISEA in particular.

STANDPOINTS

ISEA should be, could be and already is, the place where this meeting, this search for new definitions and for new ways to study reality - while at the same time being part of that same reality and constantly influencing that - takes place. There are many more 'believers' in the need for art and science to co-operate and create synergy and these are the people the idea of the Inter-Society is aimed at. As Peter Beyls formulated it in the context of the 2013 panel: "A rigorous meta-organisation should offer support that any of its substituent members cannot obtain in isolation. This has to do with emergent functionality; the synthesis of both material means and knowledge to foster the creative contribution to (electronic) culture in a global networked society. Consequently, ISEA's responsibility is primarily a social one; the creation of a platform to stimulate international interdisciplinary collaboration." And Bonnie Mitchell added: "*Collectively, art and technology organizations together can help to raise awareness and incite action to deal with pressing global issues that would be very difficult to solve alone.*" [12]

It was one of the participants of the first ISEA Symposium, in 1988, where the decision to found the Inter-Society was taken, who publicly asked, during ISEA2012, 'where the Inter-Society had gone' (or such words). Roger Malina, for many years in charge of the International Society for the Arts, Sciences & Technology (ISAST) and its journal *Leonardo*, was also the person who coined the term 'Inter-Society' for the envisioned network organisation during the founding meeting in 1988. To answer Roger's question the panel session mentioned before was organised at ISEA2013: a panel that asked the question: 'The Inter-Society revived?' As happens at discussions of ISEA at ISEA, there was much talk about the symposium and on how that could be improved. Here I will concentrate on what answers actually were given to the panel's question. By the way, it is my profound conviction that the best ideas to revive the (idea of the) Inter-Society, coincide with the best ideas to improve the symposium.

It was again Peter Beyls who formulated the main questions at hand: (1) "*how ISEA could develop as a coordinating agency, positively feeding back to a myriad of cultural players worldwide* and (2) "*integrate strategic expertise from a number of major cultural sister-organisations.*"

Beyls' own answer to those questions was a call for "*public debate in order to optimise ISEA's mission in all instrumental dimensions.*" This public debate would logically and necessarily have to take place at the ISEA symposium. In Ernest Edmonds' words "*ISEA has provided the primary international meeting*

place for artists, curators and others working in the electronic arts since its inception 25 years ago."

However, although many ISEA goers are habitués, who have attended many of the symposia and are interested in the future direction of ISEA, most people mainly come to 'network,' 'see their professional friends' or, a little more seriously, as Vicky Sowry formulated it in her panel piece: "I go to ISEA for program research: to see who is doing what, where and how." And beside the 'regular customers' each ISEA symposium attracts a large crowd of people who haven't been to an ISEA before. This is partly a result of ISEA's nomadic character. All of these participants, both the regulars as the newbies may have some interest in discussing the future of ISEA, but for none of them it is their primary reason to come to ISEA. In fact, Vicky Sowry hit the nail on the head when she stated: "*it is essential that research be undertaken to identify what is of value to which group of attendees and what the barriers/incentives to attending ISEA really are for each of these groups.*"

This research is not as easily undertaken as it seems. Anne Nigten stated in her panel contribution: "*the nomadic ISEA structure brings along a risk of unfinished strands of theory and disjointed debates.*" Nevertheless, such research is necessary and can be staged. In fact ISEA International has developed several instruments to measure the interests of the participants of each symposium in the shape of surveys. One survey is aimed at the symposium participants and is the responsibility of the symposium host, another one is aimed at the symposium host and conducted by ISEA International. These surveys need to be expanded, improved and specified and will bring more insight. However, they are aimed at the current series of symposia and the current audiences and at the improvement of the quality of the symposia. In this paper, we wanted to look beyond that and look at the chances of ISEA becoming the network organisation for the emergent arts. This implies reaching out to a specific audience, not just the random participants.

WAY AHEAD

ISEA International has formulated guidelines for the hosts (usually universities or art schools) that organise an ISEA symposium. These guidelines are a living document, because the insights develop and change on what the organiser needs to know, what parts of the event need to be (contractually) secured in order for ISEA to maintain a recognisable identity, safeguard ISEA International, the (present and future) host as well as the participants from unwanted incidents and last but not least to adjust to the changes caused by the development of the technological context. In my opinion ISEA needs to add a new chapter to these guidelines. A chapter that will describe a road towards ISEA Symposia becoming network events, not only for individuals, but for organisations and institutes. The 2013 panel contributed a number of practical ideas to accelerate this process:

- Stimulate participants to organise so-called "*Birds-of-a-Feather (BoF) meetings at ISEA*" (Roger Malina)
- Stimulate people that co-operate remotely (and that happens a lot in the electronic art world) and relevant organisations with dispersed membership to physically meet annually at ISEA
- ISEA International could be "*linking with the other growing set of specialist meetings in the area*" (Ernest Edmonds). Some of these are as old as ISEA or even older (Ars Electronica, ACM SIGGRAPH, International Computer Music Conference etc.) and we have contacts and some co-operation with them already, but there are many more new organisations and meetings. And, the next step: we could "*have partner events, especially [with partners] from science and technology fields.*" (Anne Nigten)

All this would be a beginning. It is of course not enough. ISEA might be a convenient meeting place and many organisations are already present at ISEA, officially or unofficially (and those terms don't mean much in the world of artists or scientists). But that is by far not enough. If ISEA is going to be a network organisation, it will need to give all partners in this network a voice on the future direction and content of ISEA.

Vicky Sowry: "*Networks arise and grow through demonstrated, not assumed, interest and need.*" There needs to be a real incentive for (groups of) people to co-operate. Pooling scarce means might have decisive advantages in the current, almost world-wide art-unfriendly political circumstances. Still, "*diverse ideologies could complicate a merger*" and "*hierarchies inherent in organizational entities often clash with open-source community approaches to decision-making.*" (Bonnie Mitchell) All true. But above all: "*many art and technology organizations claim to be defining the future while actually clinging to the past.*" (Bonnie Mitchell again) In other words: don't use yesterday's solutions for today's problems. In this vein: "*We don't want a federation.*" (Roger Malina)

The organisations and institutes that might organise their meetings at ISEA, either among themselves, bilateral or on a larger inter-connecting scale, must also be part of its governing. How this should be realized, I don't know. It should be a subject of discussion, staged at ISEA. The original idea of the Inter-Society as a membership organization with organizations and institutes as its members is certainly an idea of the past century. And it did not work then either. We will need to use the Internet as the place where we can work together and map the road ahead.

"*Clear vision of what ISEA is and wants to be in the coming years seems to be essential.*" (Roger Malina) This vision must be further developed in dialogue with our intended partners. This could be done, as Anne Nigten suggested, by using "*the nomadic structure to become a learning organization; [create] a learning back-office [in the shape of] a light-weight, a task oriented team of specialists.*" We (all) will first have to see the need for co-operation. Then we have

to co-operate in a way that these needs are met and find a way to 'stabilise a dynamic network.' That would be the Inter-Society.

Thanks to Ernest Edmonds for correcting my English!

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NEW DOMESTIC LOCATIONS: RECONFIGURING THE HOME THROUGH THE INTERNET OF THINGS

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ABSTRACT

This paper reflects on the reconstruction of the home as it becomes filtered through that data that is streamed from smart objects. Retrofitting a home for *The Internet of Things* involves the placement of multiple sensors that record changes in conditions in order to construct a simulacrum of the actual house from which to analyze and form understandings of behavior and in turn opportunities for connection. This domestic data shadow (as it might be called) is not just a record of one inhabitant's activities within the house, but the sum of all of the activities of all parties. The single routines that constituted patterns of behavior of personal habit and ownership become mixed in a single database that, without individual signatures, are lost and the house loses its cognitive architectures. The paper explores the implications upon the occupants sense of location as their model of home become reconfigured through the lens of a database. The paper draws upon findings of the *Hub of All Things* (HAT) project funded by the Research Council's UK Digital Economy Program.

INTRODUCTION

Introduced in 1999, the term *Internet of Things* is now beginning to make sense to businesses organizations and the general public as the flow of data between people, internet services and smart objects begins to influence the many products and systems that make up the world around us and support our daily life. The stepping stones toward living within a network society that were afforded by personal devices, from smart phones and tablets to personal health devices, were all extrapolations of a PC-based experience of the Internet. However, new smart objects are already beginning to become part of our habitual routines before they are even considered as computers. From bedside table lamps that are connected to friends and families, to thermostats that tell you that you've left your heating on, data is transforming the relationship between people and objects.

In the past many IoT projects have used the network connection of artefacts to identify cost saving and process efficiencies (e.g., vehicle manufacturers) or to track goods within large networks (e.g., logistics companies) or to monitor the health and safety of systems (e.g., aircraft manufacturers). As these systems move from business-to-business, to business-to-consumer there is a significant push to build interoperable systems that will allow different branded 'things' to talk to each other across networks. [1] Within each of these cases the scale of data that is being streamed from devices and objects that are tagged with sensors is enormous. Data about performance including a host of parameters is streamed to databases that are growing at exponential rates: *"About 90% of all the data in the world has been generated in the past two years (a statistic that is holding roughly true even as time passes). There are about 2.7 zettabytes*

of data in the digital universe, where 1ZB of data is a billion terabytes (a typical computer hard drive these days can hold about 0.5TB or 500 gigabytes). IBM predicts that will hit 8ZB by 2015." [2]

As networked objects become more common the amounts of data that they collect will soon outweigh what we know about the physical device. As artefacts share information with other artefacts around them, code can be written to interrogate their shared use. Machine learning is being used across a wide variety of databases to identify patterns in order to elicit new insights. [3] As these databases of objects intermingle with our own data shadows, it won't be long before the objects around us begin to make suggestions and possibly become more reliable than our friends at telling us what is good or bad for us.

The complex constellations of material artefacts that are connected to everyday practices, data sets gathered in real-time and algorithms that identify patterns constitute openings to new markets in which different kinds of value are exchanged. In many cases we are becoming attuned to understanding how value is constructed as we use software: social media users are becoming aware of the many pros and cons of exchanging *social values* in Facebook, while Trip Advisor users understand the implications of their liking, disliking and commenting upon the *economic values* of hotels. However, as websites and apps become replaced by objects that we use in everyday life, such as making tea, taking a shower or getting on the bus, it is less clear how the flow of data that is derived from our interactions, constructs value and is 'traded' between services. This disjuncture in the flow of value represents new and emerging opportunities that are defining how we engage with cloud-based services. New markets are being developed that generate value between the social practices that constitute mundane aspects of our lives and products and services that support them. From the Google Nest intelligent thermostat that learns how you live and promises to save you money and energy, to the Four Square and Swarm apps that encourages users to 'checkin' to places that they visit that helps build the databases of places that now appear in mapping applications such as Apple Maps. In both cases, the data produced through personal and social activities is exchanged into value to constitute new market content. Market models in which the rewards for sharing data come in one form, whilst the same data can be used by the service provider to build entirely different products for others.

DATA VALUE CONSTELLATIONS

The term 'data-value-constellations' describes how, rather than existing in linear value-chains of production and consumption, artefacts are now part of networks. The term extends Normann

and Ramirez's phrase 'value constellations,' which describes the new economic patterns that emerged at the end of the 20th century as globalization and new technologies suggested new ways to create value. [4] Recognizing the role of co-creation of value within networks, Normann and Ramierz highlight that "*successful companies conceive of strategy as systematic social innovation: the continuous design and redesign of complex business systems.*" [4] Within these systems, value-chains that mapped the linear passage of products are being superseded by complex social and environmental connections as the passage of data becomes as important as the passage of the physical object.

Recent research in value creation has explored how value and worth is produced and diminished as individuals interact with services. [5] Due to the increasing accumulation of data that is attached to services it is possible to start examining how concepts of value change as participants engage with 'contextual archetypes.' [6] Contextual archetypes are familiar social activity sets that are recognizable and consist of material and immaterial systems, for example buying coffee at a local cafe. In their paper *Contextualization and value-in-context: How context frames exchange*, Chandler and Vargo describe how "individuals pursue value service-for-service exchanges that are the basis of dyads, triads, complex networks and service ecosystems." [7] This research has revealed how markets are constructed as individuals reconcile tensions across contexts to develop 'service ecosystems.'

Writing on value and worth, Ng describes how new economic opportunities will increasingly capitalize upon social contexts that are becoming visible through the advent of ubiquitous computing. [6] Described as 'contextual archetypes' Ng suggests that, within the Internet of Things, objects change their role from being symbolic and functional to becoming agents within markets. This radical shift from vertical lines of consumption to horizontal, means that objects within an IoT are elevated to a role of actors within our networks of distribution and sharing. As objects become online, it is likely that within any given social circumstance there will be very many markets operating as the network allows everybody to trade data according to the needs of the many people within that network. As the smart phones that we carry develop data about who we are, where we are, what we like, what we are in the proximity of, what we are using and how we use it, new services will be offered in return for parts of our data. These experiences, whether we adopt them as care and play services, cheap deals or the provision of products, will constitute our experience of the cloud and any aesthetic should be considered at the point of physical interaction.

DESIGN INTERVENTION

Toilet Roll Paper as market

Through the summer of 2014, the author and his family was the subject of a study for a large consortium project that involved attaching sensors to parts of their own homes. As a member of the design team within the project, the author and team based in

Edinburgh took on the task of developing a toilet roll holder that would record how much toilet paper was on the existing roll that was in use and send the data to an online database.

The toilet roll holder was considered an interesting subject of design and development because it could provide (on the surface) an easy case study of an instrumented product that would provide the project participant who owned it, personal data about toilet roll consumption. The assumption was that this unique and very personal data would place the participant in a position of power in a new market – that of providing data about the use of toilet roll. Whilst this may sound trivial, toilet paper can be considered a staple requirement of many western homes and at present the business model for distribution is simply for manufacturers to pass them to shops for sale. The hypothesis for building the smart toilet roll holder was that knowing more about the consumption of toilet roll paper could inform the distribution, manufacture and purchase of toilet rolls (in a similar way to the Just-In-Time model developed by Toyota in the 1970's. [8]) From the 5th of April to the time of authoring this paper, the amount of toilet roll in one toilet of the authors house has been available on the internet: <http://dev.modusdeus.com/toilet/vis/>. The instrumented toilet roll holder was constructed using the Electric Imp cloud service and embedded hardware and software platform, featuring an infrared sensor to detect the amount of paper that was on the roll (Fig. 1). As more toilet paper was used, the distance between the paper and roll, which sat on a spindle, grew. Figure 2 demonstrates the use of toilet roll paper, with drops in data associated with the use of paper.



Fig. 1. First working prototype of the instrumented toilet roll holder. © Chris Speed.

Living with the toilet roll holder and its data however proved to be far more disruptive than anticipated and although it is early days before the research project understands how such personal data contributed to building a domestic market for selling data, the social impact was significant. Originally identified by the research team as an easy 'smart' object to build compared to fridges and other domestic containers which hold multiple

products, the toilet roll is at the center of highly personal practices that take place behind locked doors. Through the online graph it is possible to clearly identify events that use significant amounts of toilet paper from which it is further possible to infer particular toilet activities (Fig. 3). Upon further analysis the graph revealed to the author and his family (all of whom have agreed to the study and to the sharing of the data), a series of likely events including cleaning up after cats, the running out of toilet paper, extra house guests and somebody having a runny nose.

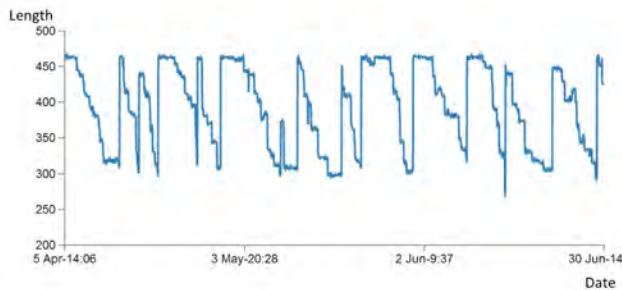


Fig. 2. An example of output of the toilet roll holder. Full toilet rolls can be identified as having the highest value up the Y axis and significant use of the toilet roll can be identified in the drops in data. © Chris Speed.

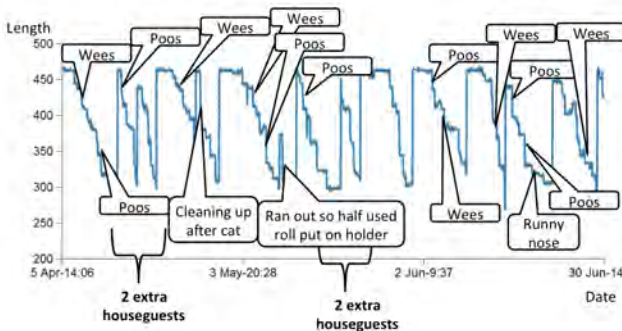


Fig. 3. Toilet roll data with estimates of usage patterns by householders. © Chris Speed and Glenn Parry.

Although the members of the family are quite happy to give the data away, the same data when correlated with other datasets could identify individuals and present a loss of privacy.

During the preliminary install of bathroom sensors in the authors' house a wireless passive infrared sensor was placed in the bathroom to detect the presence of people (Fig. 4). When the device detects movement a small red LED lights on the surface of the object telling the occupant that they have been detected. Following ethical protocols during installation, the family was introduced to the sensor and their permission was sought to gather data. However when consulting the authors daughter (8) she posed the question: "can it see me on the toilet?." An apparently simple question and one that the author could only

truthfully answer as "yes." However, the author proceeded to describe what the sensor could actually see and once his daughter was happy that the device couldn't identify her in person, concern for the device passed.



Fig. 4. Wireless passive infrared sensor installed in authors bathroom during pilot period. © Chris Speed.

Nevertheless the disruptive nature of these interventions didn't go away and once the first prototype toilet roll holder was installed the family experienced further surprises. On one occasion during July 2014, whilst the family was on holiday far away from the toilet, the software engineer who developed the device contacted the author over telephone to tell him of fresh activity on the server. Following a quick conversation with his partner, the author concluded that the change in toilet roll coincided with the fortnightly visit of the house cleaner.

Such an event highlights the complex market that surround objects that are connected to the internet and distribute data. Although consent to gather data was acquired for the family, this is not the case for visitors to the house and in particular of users of the toilet. In addition to the ethical consequences, the event also highlighted the function that connected objects can have beyond sensing the material that they are designed to. For the software engineer, the use of the toilet roll was an alert similar to that of a burglar alarm and the data an indicator of an intruder. The toilet roll holder and its connected database represent a suite of new technologies that are already available to buy. Whilst the brief summary of the social disruption that the toilet roll data has for a family is made clear due to the personal nature of toilet roll use, we should expect that all manner of conclusions may be drawn from even the most apparently benign sensor – from thermostat to toaster.



Fig.5. First batch of instrumented toilet roll holders prior to distribution. © Chris Speed.

House as database

Living in a house that gains a shadow of itself in the form of data sets had begun to change the way that the author understands his family. Not for a long time have I had to consider the toilet habits of my children or for that matter my wife. The last nappy I had to change was probably 5 years ago and soon after, the last of the nappy wipes was used up. Since then I have lost touch with when my children need the toilet, no longer do I have to smell them or ask them if they need to use the toilet. No longer do they even tell me when they need the toilet. The lack of this particular knowledge is welcome and I haven't had to think about these particular practices for a long time. With a daughter of eight years of age and a son of eleven, the lock on the toilet door has been in regular use for four years now and everybody who uses it is secure in the fact that they have achieved a level of privacy and that no one else needs to be aware of what goes on behind the closed door. But more recently things have changed.

With an accurate toilet roll sensor I now know when my family has used the toilet. The door that was previously locked tight shut has now opened just a little. As visitors come to the house I am now obliged to advise them that the downstairs toilet roll holder is online and that if they would prefer to use an upstairs toilet they are quite welcome. I have even begun to wonder if I should redact particular activity on the online graph when guests use toilet paper

or perhaps I should return their data to them on a memory stick when they leave the house. Certainly the toilet door now requires terms and conditions that should be agreed upon before entering.

On the up side I am beginning to learn more about the family's toilet paper habits and the software engineer who developed the technology is starting to explore opportunities for me to use the data in to inform living practices. The data in Figure 3 is beginning to offer information that is rich enough to begin programming alerts for me. For example, it appears that as the family runs out of toilet paper somebody places a half used toilet roll on to the holder, perhaps a sign of desperation. Chris Barker (software engineer) is able to identify this shift in data and organize a tweet to alert me to buy more toilet paper. Whilst a simple program for ordering toilet paper may not be so interesting, the important note is that the source of this data is not only personal to me, it is also owned by me. We built the toilet roll holder and I own the data. There are very few products or smart phone apps that I can say the same about. Usually I find myself agreeing to all manner of data agreements in order to get the 'free' software that is on offer. The toilet roll holder is then my first experience of producing data that I own and that I have the potential to begin to trade with. This awareness is the first step toward a significant turn in global economics – away from the established Push economy to a data driven Pull economy.

House as market place

The Push Economy, that dominated our experiences in the twentieth century, was predicated upon developing best guessed products that persisted by achieving a scale of production that secured a place on the shelves of supermarkets and a marketing budget to keep them there. As consumers we aspired to own well made products that were manufactured and distributed on a vast scale. A model that suppressed poorly made products and presented high end artisan products as out of reach.

In stark contrast, the properties of the internet that define the Pull Economy are starting to offer a different model of success. Instead of occupying the middle ground of wealth creation through the large scale production of best guessed products, the Pull economy is characterized by boutique and bespoke products that define personal identity at one end of the scale and cheap goods that let us make do and get by. This inversion of what we knew is led by the primary currency of the digital economy: data. But in the over hyped age of big data it is the agile and small organizations that have been able to develop more nuanced approaches to nurturing value for data with individuals. As the big firms figure out what to do with the vast amount of data that gathers on a minute by minute basis, micro businesses are tackling small data to create high value experiences. It is in the small business ideas that people are beginning to being offered 'value for their data' which is setting the agenda for the digital economy and placing pressure on the established organizations that previously claimed to manage our

best interests with generic models. Fitbit have led the charge within the quantified self movement, providing owners with access to software to monitor their own health, Halo have refined the taxi market and Uber promises to break it, whilst SkyScanner has unlocked the flight booking business and redefined it.

Core to all of these successes to date is the wide spread adoption of the smart phone and it's constant connection to the internet and complex instrumentation, the flow of data that is promoted through the adoption of apps that contextualize data and the data value constellations that move data between parties to construct richer experiences. So we can be sure that the smart phone has extended the complexity of the economics of data. But what happens when the same affordances are extended to our domestic products? If domestic appliances follow the same model of trading our data through the availability of free apps and undecipherable terms and conditions then we can expect that much more of our lives will become available as a database for enquiry. Unless individuals know that they own their own data, companies who offer services will need to offer relevant services and products that are commensurate with the expectations of the public as data becomes the primary currency within transactions.

As our homes move alongside smart phones to become the new market place for organizations to better understand our activities, a critical question for artists and designer will become more prominent: how to design systems that offer value for data. Whilst the toilet roll holder is a small step along the path toward a push economy, for the first time I own the data and can begin to use it to inform my own buying habits.

As society moves from a Push economy to a Pull economy, the toilet roll holder is a small piece of vital research that is required to better understand how to support the public's understanding of the trading of personal data and the appropriate interfaces (material/immaterial) in gaining control.

DISCUSSION

The implications for how the *Internet of Things* will impact upon our daily practices is beginning to be understood through the examples of how data might be used to change the value of goods and the potential for individuals to trade personal data. Heralded as the next paradigm of the internet, the connected objects that collect data as we go about doing 'things' are core to the development of new kinds of markets that will define our relationship with cloud services. Never entirely clear how the products that represent our incentives to give data away are funded or what companies do with our data once we enter an agreement, how we use things is already part of a complex web of data-value-constellations in which we hope to feel that we are getting both value for our money and value for our data. Prototype technologies such as the connected toilet roll holder demonstrates the level of social disruption that is likely to occur as it becomes

increasingly likely any personal information can be identified through the correlation of data from multiple sensors.

The aim of the project is not simply to provide people with more information, but rather to explore new cultural practices with a view of instigating behavioral change around the valuation of data. The toilet roll holder demonstrates the complex roles of participation within complex production of data. This paper asserts that markets that involve objects within social practices that, along with the algorithms of the stakeholders involved, mediate values to keep the market sustainable. Participants in such markets should consider the implications of the experiences that constitute the trading of values, from the personal to the social and the economic to the environmental.

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NEW MEDIA(TION) ART: ON THE NON-TRIVIALITY OF MEDIATION IN ELECTRONIC ART

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INTRODUCTION

This paper discusses the role of mediation in interactive art through analysis of some participatory and interactive artworks, including Lau Ho Chi's recent installation *Learn to be a Machine* (2013), an interactive installation composed of a trackball, a bench and a projection showing the upper part of a human face. The audience can control the line of sight of the face via the trackball. This direct and shallow interaction is the initial appearance of the piece. While it is intended to give an impression of a simple responsive installation that is done with computer graphics or using a database of images put together according to the trackball movements, the artist is lying inside the bench that audience sits on while they interact with the work, staring at a cursor controlled by the trackball with a webcam pointing at his face and the resulting image is projected on the screen in real-time. In *Learn to be a Machine*, the audience moves the trackball and the eyes in the projection will move accordingly. What appears to be interesting in *Learn to be a Machine* is neither the simple interaction the work affords nor the dialogical relationship the audience can enter into with the artist through the simple interaction. Both of these are trivial and the focus of the work is elsewhere: perhaps it is the initial masking of human/technology relations in the work as much more simple than they actually are.

In this paper we will briefly introduce a post-phenomenological account human/technology relations from Ihde and proceed to fuse it with Dinkla's insights on the role of audience in participatory and interactive art. [1], [2] This allows for a framework with which to discuss the flows of audience experiences in new media art. With this framework in mind, we argue that if the audience member interacting with *Learn to be a Machine* notices the artist's close presence, the human/technology relation between the audience member and the artwork shifts from being "alterity relation" to an artwork as a technological pseudo-other, into being a relation of embodied mediation between the audience member and the artist. The possibility of this shift raises questions on the role of technological mediation of human experience in new media artworks. Hence, we suggest that by contextualising *Learn to be a Machine* in the traditions of participatory and interactive art, we can highlight a possibly novel mode of audience engagement, in which the focus of the audience's experience is not on any "content," i.e. that which is accessed or achieved by the technological mediation of action and perception, but on the technological mediation of experience itself.

HUMAN/TECHNOLOGY RELATIONS

Don Ihde, a philosopher of technology in the tradition of post-phenomenology, addresses how technologies affect the ways in which humans experience the world. Building on the phenomenological discourse of intentionality as the characteristic

feature of human experience, he considers technologies as appearing in the intentionality relationships between humans and the world, in other words, as relationships between humans, technology and the world. Ihde differentiates the human-technology relationship into four types, depending on how intentionality flows into, through or, past the technologies. These types are "embodied" and "hermeneutic" mediation relations, "alterity" relations and "background relations."

According to Ihde, in both embodied relation and hermeneutic relations, the technology mediates the world to the human. For instance, we put on the corrective glasses to help us to overcome our short-sightedness or long-sightedness. The blurry world of a short-sighted vision is easily "fixed" with a pair of glasses with the suitable prescription. But what we see now in our clear vision is no longer the neutral/original world, but a world transformed in the mediation relationship to fit our otherwise blurry vision. The world we see now is a glasses-version of the world. The glasses are embodied to us like an extension and once we are habituated to the optically enhanced way of seeing, offer direct transparency on the level of micro-perception. Ihde calls this type of relations the "embodied mediation relation." Ihde suggests that human-technology relations can be described through formal framework, in which arrows indicate the flow of intentionality and in the below case of describing the embodied mediation relation between "I" and the eyeglasses, the parentheses describe a "partial symbiosis" of the subject and the technology:

(I/glasses) → World

Ihde's account of mediation extends beyond transparent mediation of perception, to technologies we need to interpret to establish mediation. Selinger describes that this that another type of Ihde's relations of mediation "arise when we enter into practices with artifacts in order to ascertain knowledge about the world that would not otherwise be available (or, would at least be more difficult to ascertain)," such as in the case of reading a thermometer telling us the temperature outside a window that cannot be opened. [3] The information we may ascertain from the thermometer is only meaningful if we know how to interpret the reading. A transformative mediation happens here not unlike in embodied mediation, but here something directly sensible, such as the outside temperature, is transformed into something we need to interpret, such as the numbers on the thermometer dial. According to Ihde, the transparency that may occur in this kind of relationship is not direct perceptual transparency, but transparency on the level of macro-perception that needs to be constituted through (learned) interpretation. Hence, Ihde refers to this type of relations the "hermeneutic relation," and in the below formalization the

parenthesis indicates the “immediate perceptual focus” of the experience, the surface of the thermometer, off which we read the world: [1]

I → (thermometer/world)

In addition to relations of mediation, there are also technologies which do not mediate the intentionality of our experience, but in which intentional experience terminates. These are alterity relations, which are very different from the relations of mediation. While embodied and hermeneutics relation, no matter directly or indirectly, let in the world, alterity relation does not. In alterity relations, the technological artefact is the “terminus of experience.” [4] A kaleidoscope, as an optical device that does not mediate, is an interesting example of technologies we encounter in alterity relations: while we look *into* a kaleidoscope, our experience terminates on the coloured fragments moving inside the device and our focus is on the intriguing, unworldly images that the kaleidoscope produces. Alterity relation with a kaleidoscope can be described as follows:

I → Kaleidoscope (- world)

In addition to relations of mediation and alterity, Ihde mentions also “background relations,” which refer to technologies such as heating and air-conditioning, with which we do not enter into direct relations. In the following, we shall see how these types of relationships map with the ways in which different kinds of interactive and participatory artworks appear to their audiences.

TECHNOLOGY AS A MEANS OF DIALOGUE IN A PARTICIPATORY PERFORMANCE

Dinkla suggests that it is in participatory art, where the roots of the current tradition known as interactive art can be found. The traditions are similar in terms of how the works regard their audiences: works in both traditions cannot exist without the participation of the audience. Considering what happens in the exhibition space, the form of participation does not seem too dissimilar: the audience needs to perform an action of some sort to complete the work. As paradigmatic examples we consider Allan Kaprow's *Happenings* and Yoko Ono's participatory performances. These shifted the role of the audience from a pure spectator to a participant: the audience became a crucial part to the realization of Kaprow's and Ono's pieces. In the famous participatory piece – *18 Happenings in 6 parts* (1959), the visitor could only experience the performances by participating in them. The participants are within the artwork. In Ono's participatory performance *Cut Piece* (1964), the artist sat kneeling on the stage with a pair of scissors in front of her. Instructions were then given to the audience, for each of them to cut out a piece of Ono's clothing. The performance ended with cloth barely covering the artist's body. Participatory art can be described, in relation to the traditions that preceded it, as aiming to close the gap between

the artwork or performance and its audience. A participatory performance like *Cut Piece* invites the audience to join the performance and suggests a possibility to free the audience from the restraints of their traditional role as spectators, to merge the audience with the artwork or the performance, even to invite the audience to actively contribute in the creative process that results in a ‘complete’ artwork. One ‘ideal’ for what participatory performance could be can be found from in Chandler's interview of Kit Galloway and Sherrie Rabinowitz who, when discussing their performance *Mobile Image*, refer to Gene Youngblood's notion of “creative conversation” as “a creative and constructive act of collaboration,” a “process through discourse, which leads to the discovery and understanding of the points of view and meanings of the other person.” Despite the relatively low-tech nature of a performance like *Cut Piece*, we may describe the technologies – scissors and clothes – as positioned in between the audience and the artist, mediating the relationship between the two. [5] The artist is present in the form of cloth to be cut and, it is the task of the audience to interpret the human being behind this medium of interaction. In a somewhat hypothetical and experimental fashion, we may suggest that there is something vaguely resembling a hermeneutic relation:

Audience → (Scissors and clothes / Yoko Ono)

Despite their shared lineage, the participatory and interactive traditions can be described as inherently different and an initial difference comes in when we further examine the nature of technological relations afforded by the artworks. Let us look at interactive artworks in the following.

ALTERITY RELATIONS IN INTERACTIVE ART: TECHNOLOGY AS PSEUDO-OTHER

This essence of participatory art as what we might, following Galloway and Rabinowitz, call “creative conversation,” often appears in a somewhat ‘reduced’ form in interactive art: often in interactive art, the audience resembles a part of a larger machine functioning to allow the piece to exist. This observation echoes how Dinkla describes participation as enabling audiences to contribute to the creative process that results in the artwork, compared to interactivity being essentially an “automatized dialogue:” between the artwork and the audience: “The artistic material of interactive art is the automatized dialogue between program and user.” The “automatized dialogue” is essentially the back-and-forth interaction between the user and the program. The conditions programmed in the machine that we call an interactive artwork limit the range of interactions possible. In Dinkla's view, in interactive art the artist is hiding behind the machine, which has taken the artist's position as the authorial leader of the performance. In this light, let us look at *Rain Room* as an initial example of an interactive installation. Consider *Rain Room* (Random International, 2012). This interactive work is a system that creates artificial rain in the space in which it is installed. Audiences can walk through the rain and stay dry. The work

consists of a sprinkler matrix hanging from the ceiling, with sensors detecting the position of a participant in the room. Participant's position controls the sprinklers: the sprinkler above the participant is always switched off. Describing *Rain Room* in the human-technology relations framework, it appears as resembling an instrument, using which a spectacle can be performed. *Rain Room* does not mediate, i.e. let the outside world in, but rather utilises its audience in order to enclose them in a spectacular world of its own. Hence, the human/technology relationship in *Rain Room* is an alterity relation: our experience terminates in the work and the world is present only indirectly.

Audience → *Rain Room* (- world)

Art critic Tabish Khan writes about *Rain Room*: "walking towards the rain and knowing it will stop is a bizarre yet enthralling sensory experience that provides an unnatural sense of control that needs to be felt first-hand." [6] Perhaps the attraction of *Rain Room* is its spectacular artifactual nature – Khan's impression of unnatural sense of control seems reminiscent of Ihde's observation, that when interacting with technologies within alterity relations, we are impressed by their "quasi-otherness." Perhaps the appearing as a pseudo-other which does not mediate, but rather in which the audience's experience terminates, could be a characteristic of works in a tradition we call "interactive art." What we refer to as "interactive artworks" can appear also in relations other than alterity relations. Let us look at interactive artworks which manifest the idea of technological mediation of experience.

TECHNOLOGICAL MEDIATION AS A TOOL

In contrast to alterity relations, Ihde suggests there is a category of relations in which experience goes through the technology into the world. These are relations of mediation. Consider *Memopol* (Timo Toots, 2012), an artwork that can be described as appearing in a hermeneutic relation of mediation with its audience. An audience member inserts their ID card into the machine and the machine will search online for publicly available information about the user, ranging from drug prescriptions to annual income. The machine will show this data on multiple screens in the exhibition space. The visual aesthetic resembles a war room with screens of data on the walls. Looking at the diagrams and charts, the user is invited to understand the amount of personal data about herself out there on the internet. Whereas *Rain Room* did not let the world in, *Memopol* operates as a portal connecting the user to their online data footprint, this reaching out to the world. In the human/technology relations framework, *Memopol* appears in a hermeneutic relation and characteristic to hermeneutic relations, we "read" the world "off" the technology, illustrated as follows:

Audience → (*Memopol*/Audience's data footprint online)

Memopol does not appeal to its audiences with spectacular pseudo-otherness, but by allowing the audience experience to go "through" the artwork into the world. We can see the relation

between the audience and the complication of their data footprint as shown in *Memopol* is similar to Ihde's account of a relation of mediation: "the technology is actually between the seer and the seen." [1] To explain the "artistic material" of *Memopol*, the "the seen" has to be mentioned: if instead of seeing their own online data footprint on the screens, audience was seeing data about someone else or knowing that it was all randomly generated, the experience would be much less interesting. [2], [1] Perhaps the mediation itself in *Memopol* is a means to access a compilation of data that would otherwise remain hidden, not unlike a thermometer allows accessing temperature through a closed window. In this light, one might propose describing *Memopol* as resembling a tool for finding out how much data there is online about oneself. If *Memopol* is one such tool, it is an effective one, inviting a host of considerations about privacy and surveillance. Nevertheless, describing *Memopol* as "interactive" (as in "interactive art") would be a superficial reference to the ways the interface of this tool operates. To describe *Memopol*'s orientation toward the world, we would be better off describing it as 'mediating' rather than interactive.

TECHNOLOGICAL MEDIATION AS AN END ITSELF

Consider *Artvertiser* (Julian Oliver, 2010), a portable installation that lets users replace advertisement billboards with images of art in real-time. Despite the relative heaviness of the augmented reality "*Artvertiser Binoculars*" device, especially if compared to eyeglasses and such, looking at how experience goes through the artwork into the world, *Artvertiser* exemplifies Ihde's "embodied relations:" within the limitations of camera and display resolution and graphics processing speed of the embedded computer, it aims at providing pure perceptual transparency with the little twist of advertisements being removed in the process of mediation. The embodied mediation relation with *Advertiser* can be formalised as follows:

(Audience/*Artvertiser*) → World with images of art on top of advertisement billboards

Not unlike *Memopol*, also *Artvertiser* is, "between the seer and the seen," like Ihde describes relations of mediation. [1] We noted that a description of *Memopol* must make reference to the "seen:" one's personal data. In case of *Artvertiser*, it is especially interesting to note that the pictures of art, i.e. the "seen" is rather irrelevant compared to the attraction of the mediation itself. That in some of the documentation of *Artvertiser* only a purple placeholder square with text "Your art here" is displayed does not take away the least of the work's significance. Perhaps the transformative mediation in *Artvertiser* is not a means to an end, i.e. to seeing art instead of advertising, but the "artistic material" of *Artvertiser* are not the "seen," i.e. the images of art, but the mediation itself. [2] A similar focus on the mediation itself could perhaps be described in *Descriptive Camera* (Matt Richardson, 2012): while its interface is easily associated with a traditional visual instrument, when audience takes a picture with the

installation, the camera will print, instead of an image, a textual description acquired by uploading the image to have its contents described by employees of Amazon's Mechanical Turk service. The artist has a limited say in regard to what is being captured and the textual descriptions themselves are of little artistic merit, it is the transformative hermeneutic mediation where the work's artistic material is to be found.

Cleland, discussing *Artvertiser* in the context of artistic applications of augmented reality, suggests that "this type of experience is more accurately described as 'Diminished Reality' or 'Directed Reality' rather than Augmented Reality." [7] Cleland (ibid.) suggest that AR applications like *Artvertiser* "extract, emphasize and interpret a limited slice of the reality that is available to us in our unaugmented visual field. They frame and direct our understanding by giving pre-fabricated and partial interpretation and analysis, thereby limiting and constraining our perception and understanding." As is characteristic to technologies appearing in embodied mediation relations, an "amplification/reduction" structure is manifested also in *Artvertiser*. [1] Ihde describes how a telephone can 'amplify' your voice from the other side of the world for me to hear, while, as a "monosensory instrument," it also reduces "your phenomenal presence" into "that of a voice." In this light, perhaps we can describe the partiality of mediation in *Artvertiser* pointed out by Cleland as characteristic to the work's nature as an embodied-mediating technology. Through transformative, amplifying/reducing mediation of microperspective, *Artvertiser* reveals to the audience a cityscape without advertisements and may trigger considerations like those of Lussana and Novati: "*our public city landscapes are bulging with publicity, we want to take that space back and personalize it.*" [8] Perhaps these reflections do not arise thanks to seeing a previously inaccessible "seen" through a new mode of technological mediation between the "seer" and the "seen," but thanks to experiencing the technological mediation. If *Memopol* failed to show us our data footprint and showed the previous participant's data footprint instead, we would perhaps be disappointed in the work's ability to deliver what it promises. However, finding inadequacies in that which *Artvertiser* allows us to perceive would be to overlook the suggestion that perhaps the "artistic material" of *Artvertiser* is the technological mediation itself, that which happens between "between the seer and the seen." [1] While both *Memopol* and *Artvertiser* essentially are 'mediating' rather than 'interactive,' *Artvertiser* focuses on the mediation itself, not on anything resembling "content."

LEARN TO BE A MACHINE

Learn to be a Machine (Lau Ho Chi, 2013) is an interactive installation consisting of a screen showing the video of an upper part of a face, a trackball and a bench. The eyes projected on the screen follow the instructions given by the audience through the trackball. Initially, the work gives an impression of a video being generated algorithmically. The banal appearance is intended as giving participants an "old-school" impression. Initially, the work appears to the audience in an alterity relation, as the technological

pseudo-other of interactive art, which we may formalize as follows: Audience → *Learn to be a Machine* (- world)

Interacting with the work for a while, the audience may find tiny signs of humanity in the image, perhaps a twitch in the eye or an uneven reaction time, something too real to be algorithmically generated. Looking around themselves, the audience finds holes in the bench they are sitting on or, that the bench has the proportions of a coffin. Perhaps another audience member informs them that something may not be what it seems. Participants who pick up these hints are led to focus on the production of the video feed instead of the video itself. The actual mechanism of the work is totally different from algorithmic generation: it is a live camera feed from within the bench, where the artist is lying down. There is a monitor above the artist's face, showing a cursor controlled by the movement of the trackball in front of the bench and a webcam pointing at the face of the artist, who concentrates on staring at the moving cursor. What seemed to be an alterity relation, is actually an embodied relation of mediation and what seemed to be a technological pseudo-other, is actually a real human being.

(Audience/*Learn to be a Machine*) → Artist

In regards to technologically mediated interaction between audience and the artist, *Learn to be a Machine* seems to resemble performance, in that technology facilitates a interactions between the artist and the audience. Also, the involvement of the artist, another human being, in the human-technology relation in which the work appears to the audience certainly seems to invite justifications for referring to the interactions in *Learn to be a Machine* as a form of conversation. Consider *Cut Piece*, which we described before as a paradigmatic example of participatory performance. Despite the relatively low-tech nature of *Cut Piece*, the technologies – scissors and clothes as positioned in between the audience and the artist mediate the relationship between the two. The artist in *Cut Piece* is present in the form of cloth to be cut and, it is the task of the audience to interpret the human being behind this medium of interaction. However, despite the presence of human being at the other end of the relation, *Learn to be a Machine* cannot be exhausted by describing it as a performance.

In *Learn to be a Machine*, the form of interaction with the artist is constrained in a fashion characteristic to technological interactive installations, like for example *Rain Room*. There is relatively little variety in the range of inputs the participants can give to the machine in *Learn to be a Machine*. The constraints placed on the dialogue by the circuit of trackball, cursor, camera, screen, prevent the dialogue from turning into anything resembling a "creative conversation." [5] The dialogue remains "automatized," and not only the audience but also the artist appear to have been subjected to the "technical means of control" that constrain the form of interaction afforded. [2] After discovering the artist inside the bench of *Learn to be a Machine*, the playful qualities of the

interaction with another human being through technology can sustain audience's interest for some time, but soon the superficial and shallow nature of interactions with the artist becomes evident and the audience understands that their 'conversation' with the artist is not going anywhere interesting. The artistic material of *Learn to be a Machine* is not to be found in the automatized dialogue between the audience and the artist, as Dinkla suggests to be the case for interactive art. Also, an observer will relatively quickly grow tired of watching eyes move on a projection. [2] In regards to how the work appears from an observer's position, an interesting contrast can be found for example in Stelarc's *Ping Body* (1996), which despite also relatively constrained form of interaction, constitutes a sufficiently interesting performance for non-participating observers. Whereas in *Memopol* that which is 'seen' needs to be accounted for in order to describe the work, the 'seen,' i.e., artist's performance in *Learn to be a Machine* is trivial, like the actual pictures of art are in *Artvertiser*. The artistic material of *Learn to be a Machine* is the embodied relation of technological mediation between the audience and the artist.

CONCLUSIONS

In this paper, building on insights from post-phenomenological philosophy of technology, we have discussed the role of technological mediation of experience in electronic art, with hopes to invite a re-examination of the role of mediation in what is often colloquially referred to as 'new media art.' Describing a range of examples, we have proposed that a distinction could be made between 'interactive' and 'mediating' artworks, based on the flow of the audience's experience. We have suggested that it might be feasible to consider interactive art as those works which appear in alterity relations, i.e. as a pseudo-others *in which* the audience's experience terminates and, as 'mediating' artworks, those which appear in either embodied or hermeneutic relations of mediation, i.e. those *through which* the audience's experience flows. We have further distinguished between 'mediation as a tool,' referring to works which reach out to the world surrounding themselves and which cannot be exhaustively described without reference to that which is 'seen' through the mediation (i.e. something resembling 'content') and 'mediation as an end itself,' where triviality of the 'seen' or the 'content' invites focusing on the mediation itself. This allowed us to contextualize Lau Ho Chi's installation *Learn to be a Machine* in terms of its participatory, performative, interactive and mediating qualities. Articulation of the ways in which these relations can be nested and stacked together and an account extending the discussion into the direction of post-human intentionality are both possibly interesting topics of further enquiry, but unfortunately their exposition would be too lengthy to fit into this paper.

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SPECIALIZED COMPETENCE OF ART AUDIENCES AND THE SIGNATURE OF TECHNOLOGY ARTISTS: A LOOK AT THE HISTORY OF ARTSCIENCE AND CRITERIA FOR EVALUATING IT

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ABSTRACT

The number of cooperative research projects in art has grown significantly in the last decade – something that is due to institutional developments as well as technological change and the digital age. One reason is that art educational institutions are pressured to incorporate a research requirement, which has given rise to a paradigm of “inquiry” in artworks. But the spread of research element in art is more complex and the institutional factors play just as important a role as the momentum of art’s own internal logic. We can’t overlook developments based on artists’ curiosity, their desire to try new media and create new works.

THE MOTIVE FORCE OF ARTSCIENCE

An attempt to determine the roots of the nexus between science, technology and art can lead us all the way back to the Renaissance, but the more recent history of the trend is connected with the early 20th century and the post-WWII art scene, in particular the 1960s. Cooperation-based and interdisciplinary projects became important in parallel with the potential of art reaching a certain point of exhaustion. Art’s sphere of self-expression became a collective creative area, artworks became anchored in context and there was an influx of art into the natural and urban environment. All these changes and trends, coupled with the expansion of the traditional art creation materiality, created a spacious creative environment that has become almost the norm in the present-day. The terms used to describe all this – such as AST (Art, Science, Technology) and ArtScience – reinforce the feeling that single-medium-based art is a stranger at the feast of interdisciplinary joint creativity.

Along with ArtScience, there’s now the term Hybrid Art, which has been used by the Ars Electronica annual festival held since 2005 and which defines the media art landscape.

I would submit the following as the forces that define modern artscience and hybrid art:

- Changes stemming from the logic of art history, art history reaching a certain “end” and exhaustion; an aspiration, occasioned by lack of novelty, to create something new by recombining the old.
- New and digital technologies entering the art sphere, which has given rise to a new type of artist proficient in rational use of technology and able to utilize technologies in art in a diverse manner.
- Institutional pressure factor – the requirement that educational institutions engage in research – has led to a need for art practices in which artists analyze themselves and their activity and the content of art practice becomes the observation of the practice itself.

- Non-standard problems arising from environmental studies, which have no suitable research practices and where art practices prove the most appropriate for examining and presenting them.
- The performative science paradigm, which tries to unite the life sciences and biotechnology with local communities.

OBJECTIVIST, MECHANISTIC AND SERIAL STRATEGIES IN ESTONIAN ART

Any discussion of Estonian art of this type must begin with an event called Harku 75. It took place in Harku near Tallinn, in 1975 and it was a cooperative event produced by young scientists and artists and ultimately a cooperative activity held between artists and musicians. The scientists offered an environment for interaction and exhibition space at the Experimental Biology Institute in Harku. [1] Harku 75 presented intermedia and multimedia, the event can be considered to have definite parallels with international developments. Due to the fact that the Soviet Union was isolated behind the Iron Curtain, it remained “underground;” such art did not appear at official exhibitions. [2]

We know that research-oriented art aspires to objectivity, provability, non-subjectivity. If we look at Estonian art, we readily see the antecedents for the development. Leonhard Lapin wrote in 1975 in his presentation “Objektiivne kunst” (which he presented at the Harku 75 exhibition): “An objective artwork is not an expression of reality, but a part of reality, reality itself. An objective artist cannot express, but constructs; his or her creative process is not so much emotional and spontaneous as intellectual.” [3]

It is noteworthy that Lapin stresses the state of a component of reality of an artwork, the ulterior motive of which, as later becomes evident from the text, points to the industrial and urban environment. Another nuance found in the text is the assertion that the artist does not express but rather constructs. Here Lapin stands in counterpoint to the lyrical-romantic movement, which is “[...] a mix of post-impressionism, Fauvism, Expressionism, Cubism – continuing the traditions of the Pallas Art School.” [4] He critiques it as well: “Yet this direction is not capable of offering anything besides the sensuous, creating new visual structures only thanks to an eclectic synthesis of various artistic currents from the interwar era.”

Lapin links objectivism with the activities of the 1920s artists and the Estonian Group of Artists. He considers the mid-1960s to be a resurgence of Objectivism, seen in the work of Kaljo Põllu and Tõnis Vint. The activities of the groups Ank 64 and SOUP 69 are covered and Lapin gives us a short history of the art of the 1960 and 1970s, which is now become public and official. Toward the

end of the article, Lapin writes: "Objective art, which is currently at the level of laboratory experiments, may be quite subjective, seeking ultimately a universal language for expression for art. His goal is to become an integral part of the new, industrial reality, the manmade environment. His goal is to shape a new relationship, solve a new problem – person-machine." [5] Themes related to man and machine are treated in Lapin's later series "Machines" (1973-1979) and its sub-series "Woman-Machine" (1974).

Commenting on the topic of seriality and knowledge, Lapin notes [6] that he was influenced by Tõnu Vint, who is one of the most charismatic Estonian artists of the 1960s. Vint was in turn influenced by Ülo Sooster, whom Vint visited in Moscow and who also visited Tallinn. (Sooster, although Estonian, stayed in Moscow after serving in a Siberian prison camp.) Sooster had contact with the progressive artists working at Znaniye publishers. Yuri Sobolev was the head artist and Ilya Kabakov and Vladimir Yankilevsky were also at Znaniye. There scientific ideas were hatched. All manner of fantastic theories were permitted to see the light of day there, which the artists illustrated. In Lapin's opinion, this "scientific" nature came from this environment. [7] Back in the 1960s, there was a general infatuation with all things science-related.

Lapin also opined that seriality was related to scientific methods. "I think it's the systematic work and conducting of experiments that is part of science – the fact that experiments are conducted, conducted until the experiment gives you something else." [8] A year earlier, in 2006, when asked "what is objective art?" Lapin provided commentary on his 1975 positions as follows: "I thought up this term myself. In the West there was talk back then of object art and art objects, but the term 'objective art' means that art was not just a reflection of the external environment but that objects were also created, objects that were independent with regard to the external environment, based more on scientific analysis, like scientific discoveries." [9]

Lapin deems the practical reason for seriality to be the fact that individual works do not have an impact at the exhibition. "If you put an idea into one work, it doesn't have weight at the exhibition." [10] He said he worked with series, which was a kind of mechanical principle that one idea can be developed in different directions. [11] In this manner, Tõnis Vint and Lapin represent the approach that a work is in fact a series of works, not an individual picture.

This is even clearer in Raul Meel's art – in particular *Taeva all/ Under the Sky*, a silkscreen print project consisting of tens of silkscreen paintings. The particularity of this project, started in the early 1970s, is that each painting is created by printing two superimposed images. Before that, though, the artist played with formulas to test the permutations "theoretically." The basis for the combination was two colours – blue and black – and six images, the visual basis of which were schemes taken from

"Masinaehitaja käsiraamat I" (1968).

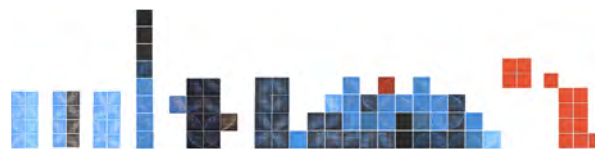


Fig. 1. Raul Meel, *Under the Sky*, 1969–1972, 2014.

Each combination was recorded as a formula of letters and numbers, for instance: DM90/CS-180. This formula means that the uppermost is a black (M) D shape turned 90 degrees clockwise and the lower one is a blue (S) basic C shape turned slightly less than 180 degrees. Meel wrote down 5,328 such formulae. [12] For Meel, working with formulas and running through visual works before executing them was similar to the "scientific method" as well as to the creation of a certain "model." Still, the criterion of trueness was the artist's intuitive decision regarding whether the result was "right." Meel wrote dry formulas as the preliminary work leading up to the art in order to create actual prints, of which not all were necessarily acceptable to him. The artist made the decision regarding whether the composition was right based on an inner feeling.

What happens if such an artwork ends up in a gallery, before an audience? The worst is that the viewer "does not agree" with the choices made by the artist, the combination (formula) and, having an understanding of the rules of composition and conjectures that a different combination would have been better. But understandably, the artist is in the dominant position and the artwork is like a proposition that the viewer accepts or not, deems "true" or not. If the work is not accepted, the question is how statistically significant the non-acceptance is. If a non-accepting viewer is only one of 10, then the artist is "in the right" but if most viewers do not agree, then the artist was "wrong."

But what happens if the artist is "wrong?" In a totalitarian society, the result can be physical repressions, while in a democracy the worst case is scorn and opprobrium; as a rule, it depends on the case. For the most part, feedback is not harsh, if the artist is fortunate, he experiences a criticism of "non-acceptance," which he can agree with or not, but which undoubtedly affects his reputation. In this manner, an artwork that doesn't resonate in the consciousness of most viewers simply goes ignored. It might happen that it becomes relevant only later, as has happened with artists who have been discovered posthumously. Then we can say their art has taken on resonance and met with majority approval. We can certainly cite such examples from science as well - that a scientific assertion made at some time is not understood by the public and is more denounced, with the scientist facing repression. The fate of Giordano Bruno (1548-1600) is a classic example. He defended a heliocentric view of the universe, was branded a heretic and burned at the stake. But the influential non-acceptance by the Catholic Church cannot

be compared with the non-acceptance that artists experience in the modern art scene. We can also find examples in Estonian art, such as Valdur Ohakas, Ülo Sooster, Olev Subbi, whose artistic work met with negative reactions in the Stalin-era Soviet Union and they ended up in Siberian prison camps.

BIOLOGICAL TECHNO-UTOPIA

I would consider another key episode in the development of artscience in Estonia to be the third annual exhibition of the Soros Centre for Contemporary Art, held in 1995. Its curators were Sirje Helme and Eha Komissarov, but Ando Keskküla was also behind the event. *Biotoopia* was derived from three words – biology, technology and utopia. Sirje Helme's foreword for the catalogue defined the paradigm and context for the activity. She wrote that *biotopia* focused on the meeting point of two worlds – the biological and the cybernetic – which could be a critical point in the creation of a future utopia. The exhibition programme left no room for juxtaposition or opposition of art and science or even their treatment as different paradigms.

As to the reason that art and science were not placed in opposition, she wrote: It is first and foremost because the global village does not necessarily mean only the assimilation of people and their views and the rapid spread of information. It could also connote undividedness, the absence of oppositional pairs, the disappearance of narrow specifications and the equal distribution of tasks between the "villagers." [13] Helme also referred to the popular notion that *"Yet the popular view that is still holding its ground makes a simple differentiation between art and science. Artist deal with emotions, scientists with reality and logic. This means that the well established schemes, the ideology of Romanticism on the one hand and the world view based on Newton's mechanical universe on the other, are still being used."* [14]

At the end of the introduction, Helme lays out a development arc which, as we would see later, experimental scientists and artists would start to follow in the decades that ensued. "An exhibition *Biotoopia* which is inspired by a kind of technological fundamentalism offers the artist the possibility first of all to analyse the pivotal moments we find ourselves in, our problems, fears, pains and hopes from the acceptance of the new environment to its total negation and at the same time, to point out that the code of life has hitherto consisted of four letters, but that the computer environment might be capable of reaching the frontier where the generation of new artificial life would no longer be impossible." [15] The significance of *Biotoopia* lay in the fact that the authors' set expanded, with scientists, doctors and people from other walks of life joining their ranks. Margus Punab (andrologist), Raik-Hiio Mikelsaar (medical researcher and molecular biologist), Andrus Salupere (technology scholar), Raivo Vilu (bio-technologist) added a key dimension to the exhibition. At the exhibition, Andrus Salupere (whose name is accompanied also by physical mechanics researcher and academician Jüri

Engelbrecht and mathematician and physicist Pearu Peterson,) presented the project *"The Formation and Interaction of Solitons."* A soliton is a wave of permanent form, that is localized and has constant value, writes the author. From that point, Salupere answers the question, *"Why are solutions to certain equations included here in this exhibition?"* It turns out that it is a scientific visualization, but it could also be expressed by his more basic comment: *"The diagrams often turn out to be especially interesting and beautiful [...]"* [16]

Margus Punab showed, in four photos and three prints, images of deteriorating spermatozoa. This alluded to the declining fertility of males over the last half century. Raik-Hiio Mikelsaar presented molecular models created at the University of Tartu's general and molecular pathology institute; the models were used in academics and research in various countries. In the catalogue, Raivo Vilu wrote about the possibility of life on the Internet, which forced the reader to strain his imagination and signalled what an arduous task it is to copy the code of life, asking whether it would become possible. In spite of the massive power of computers, they are not capable of becoming alive by processing DNA. He closes his piece on an optimistic note: the Internet is creating an environment where it could become possible.

"We are probably very soon going to find out the codes and patterns of artificial life. And we are to hope that it would be a friendly kind of life," Vilu writes. [17]

It's no coincidence that the most provocative, edgy achievements of science and technology are related to manipulation of living matter, projects where artists and scientists have been able to modify living matter or create new combination of living things. Ten years or so after *Biotoopia*, we see projects on the international art world that already actually copy and splice DNA. This can be seen in Eduardo Kac's *"Genesis"* (1999), *"GFP Bunny"* (2000) and *"Natural History of the Enigma"* (2003/08). Critical positions regarding DNA manipulation can be seen in Paul Vanouse's works *"Latent Figure Protocol"* (2007-09), *"Ocular Revision"* (2010) and *"Suspect Inversion Center"* (2011). Articulating the relationships between the technological and biological is the key preoccupation in Oron Catts' work and his research initiative in Perth, Australia (Tissue Culture & Art Project, 1996). Along with colleague Ionat Zurr, he has coined the term "semi-living" to connote real half-alive tissues that are created and used in experiments.

TEHNOBIA

Tehnobia, curated by Leonhard Lapin at the Tallinn Art Hall in 2006, is worthy of note. Its novelty lay in the proclamation that nature, culture and the human organism were a collective life form. With its appealing exhibition title, Lapin built on his earlier interest in fusing technology and the human organism. *Tehnobia* constituted a break-in through an open door, as quite a few techno-bio exhibitions had already taken place by then. Reviews of the exhibition were informed by *"Biotoopia"* and a number of Ars

Electronica festivals, such as “*Genetic Art - Artificial Life*” (1993), “*Fleshfactor*” (1997), “*LifeScience*” (1999) and “*Code*” (2003). [18] In some manner, they all dealt with uniting the living and the technical, either on the level of thought-experiments or prototypes.

From *Biotoopia* to *Tehnobia*, the intervention of science and biotech in the creation of exhibition items was theoretical, if not lacking. This was more of a typically artist-like metaphorical game and an acknowledgment of the greater role the prevalent technological world was playing. There was still not “wet” art to be seen. [19] “*In the Art Hall, we see symbolic representations, art projects – and that is after all what this art exhibition is, not a real intervention on the borderlands of life and technology,*” I wrote at the time. [20]



Fig. 2. Taje Tross *M Model*, 2005, installation.

ARTIST'S EXPERIMENT AND SCIENTIFIC EXPERIMENT: THE “PROVABILITY” AND CREATIVE DISTINCTIVENESS OF AN ARTWORK

If we examine the category of hybrid art, questions about “provability” and verifiability arise. How true are they, aside from being compelling artworks? The problem is that artists create works that are so complex and technically opaque that it is not possible to evaluate the work’s technical structure without specialized skills or technical instruments. An artist’s work as an artistic statement cannot be refuted without an expert analysis. An artist’s experiment is distinct from a scientific experiment in the sense that provability is not the main consideration in art. The finding of the artist’s work is presented as a visualized, digitized or objectified position. Its truth-value is confirmed or disproved by art-critical text. It may happen that subjective, non-true, “bluffed” art work that is based on scientific knowledge takes on a value in social discourse, having something to say to the public or in the art context in an original way. An art-critical text accepts or disputes a work. But a critic may be just as misled as the viewer. A critic may deem as truth whatever the artwork presents through

the artist’s “mouth.” The chain reaction of acceptance that comes about as a result makes it pretty much automatic that ordinary viewers will accept the value of the work.

If the work is declared “false,” fraudulent, this could have the same significance than were it to be deemed true. In the case of art the most important thing is whether it “works” – does it generate a response and interest and not leave viewers ambivalent. If projects in science can be distinguished as either true or false, in art truth can mean that it functions in terms of art communication. On the other hand, a work that does not generate feedback and as a result is invisible – even if the assertion it makes is scientifically true and correct – may be false. I would highlight one more parameter encountered in art: creative distinctiveness and creation of a “trademark.” This is the use of a common visual element or theme that makes the artist and the art recognizable, distinguishable. A “trademark” can also be created for substantive or commercial reasons. Considering that achieving distinctiveness became a consistent artist strategy in the visual art of the 20th century, the question is: to what extent do we see this in technological art and hybrid art approaches?

WORKS THAT REQUIRE SPECIALIZED COMPETENCE

Works that require specialized competence are ones that must be evaluated by a specialist in a technology or profession in order for its trueness to be validated.

Eduardo Kac’s *Natural History of the Enigma* (2003/08) involved a protein produced by Kac’s genes in petunia leaves. In a private conversation with the biologist, I learned that it was not possible to interlace plant and human tissues. I could ask whether I would be able to distinguish the “edunia” created by Kac from natural petunias. A biologist might be able to do so. As an art observer, I am completely within my rights to agree or disagree with Kac when I see bio-art-manipulated plants that do not differ to any notable degree from the originals.

Thus the viewer cannot prove without additional technology that Kac’s work is what the artist claims it to be. The question on whether the work is true or not is, in fact, what constitutes his or her “artistic truth.” This is so even if it remains just a conceptual project, a proposed idea for a possible future work. Looking for counterarguments, I found the blog of Danny Chamovitz [21], who believes that Kac’s “*Enigma*” is not a “hybrid” but 0.003% Kac and 99.997% petunia (he sees the term hybrid as more biology-based; it has a somewhat different shade of meaning in art).

In his writing, Chamovitz refers to the fact that plants have genes (BrcA and Cfr), that are shared by humans and thus all plants are “plantimals” – the word that Kac used in his project. We could also say that people have genes (Det1 and Cop9, which are necessary for photomorphogenesis) and these are also shared by plants – could we be viewed as “aniplants,” then? [22]

To what extent can laymen viewers be fooled? The question is

about the possibilities of innovation and novelty in art as a whole. In a situation where art (and even innovative technological art) has exhausted many of its possibilities, artists are gravitating to adjoining specialties, harvesting ideas and bringing them back and thus refreshing their work. The critical discussion is centred on the result and the question of whether new meanings and discussions arise. If they do, the crossing of various fields and hijacking of ideas has been productive. If not, then it is just a simulation of innovativeness and the emperor is wearing no clothes, as it were.

Heather Dewey-Hagborg's "*Stranger Visions*" (2013) deals with genetic tracking, [23] which makes no bones about the fact that the portrait generated is vague, conjectural and imprecise. The work raises the question about whether genetic tracking is possible, something we could fall victim to unwittingly. In the case of Dewey-Hagborg's project, vagueness and conjecture is an overt part of the work. For instance, people could not be identified in reality based on their portraits. Her artwork contains social, technological and scientific commentary – essentially that the technology in the future will be better and allow the owner of genetic material to be determined with portrait-like accuracy.

She writes: "*Stranger Visions* is meant as a provocation, a confrontation with the viewer containing the possibility that someone can analyze DNA and identity on the basis of a footprint he has unintentionally left." [24] This example does not hide the fact that the project is limited, insofar as the result, 3D portraits – is vague in spite of the fact that the state of the art technology is used. All of this is completely acceptable when placed in the art context. We could ask whether a "vague" result would be acceptable in science. Likely not and this would expose the different tolerance in the art and scientific fields have with regard to accuracy and verifiability.



Fig. 3. Heather Dewey-Hagborg, *Stranger Visions*, Self-portrait Based on mtDNA, Ancestry Information Markers and 50 trait specific SNPs describing gender, eye color and detail, hair color/baldness, hair curliness, complexion, skin lightness/darkness, tendency to be overweight. <http://www.deweyhagborg.com>

A work by an Austrian artist, Thomas Feuerstein's "*Pancreas*" (2012, glass, brain cells, steel and technical equipment, measuring 230 x 800 x 200 cm) was executed at the Innsbruck Medical School radiotherapy and oncology radiation department. The

author writes that the process-based sculpture "*Pancreas*" transforms books into sugar (glucose), which feeds people's brain cells. [25] *Pancreas* is a pataphysical machine that uses biotechnology for translating books into material and flesh. [26]

Feuerstein's project does involve scientific equipment and convincing manipulations, but the goal of the process – feeding a "brain" – is handled as an artwork, sculpture and installation. This makes the solution playful as a whole, something witty and ironic, but in any event, only a half-realized scientific experiment and moderately interesting artwork or so it seems to me. The possibility of producing glucose from cellulose might seem novel to a layman, but not to a specialist. The projects by these three artists – Kac, Dewey-Hagborg and Feuerstein – have in common a use of scientific technology, but the result is vague or half-realized. It is impressive that the projects were executed, but it is not enough for critical observers and those interested in innovation.

CREATIVE DISTINCTIVENESS AND THE SIGNATURE OF TECHNOLOGICAL ARTISTS

To what extent does an artist's "creative character" and "individual signature" manifest itself in artscience and hybrid art? We know how the artist's signature was fetishized in 20th century art, which has been critiqued and which artists have attempted to "overcome."

Let us look at examples that can be categorized as artscience and hybrid art.



Fig. 4. *Pancreas*, 2012. Thomas Feuerstein.

In his works "*Latent Figure Protocol*" (2007-09), "*Ocular Revision*" (2010) and "*Suspect Inversion Center*" (2011-), Paul Vanouse has consistently pursued an interest DNA analysis themes and has varied them using different ideas and visualizations. [27] In his work "*Latent Figure Protocol*," he calls the objectivity of DNA tests into question and shows how to create analogous forms using a synthetic plasmid. Critical commentary is related to the risks related to assigning credibility to DNA tests. Other aforementioned works are similar to an experiment installation in the sense of the hardware and software used. Vanouse operates within the bounds of a recognizable "trademark," as an artist DNA tester. With "*Latent Figure Protocol*," the result is perhaps the most like a traditional artwork and most accessible to the general public. It deserves to be mentioned that the installations are performative, with a certain

time and public participation necessary for execution, the questions and answers thus provide an additional dimension and educating the audience is not just of passing importance.

Dmitry Gelfand and Evelina Domnitch create environments that can be perceived and grasped with the senses, uniting physics, chemistry and computer science with an unusual philosophical practice. [28] The installations are characterized by the dimension of mutability, they are performative. "*Camera Lucida*" (2003) is the quintessence of this quality, [29] It bombards a gaseous environment with ultrasound waves to create sonoluminescence. The heat of the bubbles that burst in this environment are almost as hot as the Sun. Before the viewers are taken to the installation, they stand in total darkness for five minutes so that their eyes can adjust, as the art is otherwise almost imperceptible. The authors themselves argue that too little attention has been paid to this phenomenon in physics and chemistry, hence their interest in an ephemeral and audiotively generated visual environment.

Their works *10000 Peacock Feathers in Foaming Acid*, (2006), *Sonolevitation* (2007), *Hydrogeny* (2010) and *Memory Vapor* (2011) all involve delicate physical, chemical and acoustic processes that are reminiscent of a scientific experiment balancing on the border of credibility. To the viewer it sometimes appears like a trick but that makes the effect all the more captivating and even specialists are convinced.

The authors' fragile experiments is the "signature:" science experiment-based and imperceptible, fleeting events; participation in them is a performative ritual that becomes an esoteric performance. The German artist Julius Popp makes original and creative use of technology to create projects that transcend artscience. He has three project series: bit.series, macro.series and micro.series. If we take a closer look at the three works *bit.code* (2009), *bit.fall* (2001-2006) and *bit.flow* (2008), the first thing we see is the name as a trademark. The works are about the frequency of use of words on the Internet and deal with displaying them through various visualization media. The installations are part of the same family in the visual sense.

In "bit-code" the viewer sees black and white moving plastic strips on the walls, which from time to time form words. [30] In "bit.flow" we see fluids of different colours being pumped through plastic hose; they occasionally form graphic images - words. [31] "bit.fall" for its part is a curtain of falling water on a dark background, [32] where a computer-controlled water diffusion system allows drops to fall with perfect timing so that over a fraction of a second, we see the words that appear most often in news sites. [33]

The author calls the work a net-based installation. "The water droplets are like building blocks, like bits that are used to form information. These minute information components are just as ephemeral as time, which our media-centred society needs to grasp, exchange and update information." [34]

No matter how the artist accounts for the work and the critics' reviews, the "bit.fall" installation is a direct hit: it is vivid, captivating and popular. No explanatory texts or analysis must be read to understand it – it works with an immediacy that needs no intellectual filter. What Popp's installations have in common is that they use words, are controlled by a computer algorithm and feature online text search.

CONCLUSION

There are other examples from Estonian artists as well – such as Timo Toots's ID card or the document-reader-based installations *Auttahvel* (2009) and *Memopol* (2011). [35] Taavi Suisalu's *Epicenter* (2010) harvests real-time text from 30 news sites and displays it in the form of a minimalist screen installation in conjunction with an audio environment. [36]

These projects also demonstrate what I described earlier: web-based text generation and discernible interaction mechanism. Returning to the assertions I made earlier, such the problem of specialized competence, which we need to perceive technical artworks and creative distinctiveness and the artist's "signature," we see what we could also see earlier, in the 20th century. The problem of specialized competence does not only exist in technological art but in other art forms where the viewer is expected to be educated and have a more in-depth understanding of the work. The viewer must be aware of games revolving around the materiality of the art, the nature of the work as an object and the ideas that led to the specific artwork – after all, it does not exist in a vacuum, but in a cultural and temporal context. The examples of artscience detailed in this essay are a critical example of a situation where only specialists – not to say scientists in a very arcane field – are capable of gauging the trueness of the works. The artist generally does not create his or her works for such specialists; they are intended for the layman, who is sometimes hoodwinked. But this situation imposes quite a high competence requirement on the audience and the critic, the need to be an expert not only in the art process but also in the field of the specialized science which informed the creation of the work. The projects by Eduardo Kac, Heather Dewey-Hagborg and Thomas Feuerstein required scientific expertise and readiness on the part of viewers to deal with technologies that are not exactly commonplace. But all of the projects were, in a sense, unfinished, playful, disputable and questionable in the sense of the visual elements.

Nevertheless, they received recognition from the conceptual viewpoint. Creative distinctiveness and artist's signature in technological art are presented here as a provocative question that I have tried to answer briefly through examples of art. Here as well, the artist is bound by the deliberate and intuitive games that work not only in art but in human culture more broadly: to make oneself visible, one has to identify and define oneself with media and topics. We see this in the case of Paul Vanouse, Dmitry Gelfand and Evelina Domnitch and Julius Popp, who use definite themes, technologies and recognizable rituals in the performative

sense. The authors have aspired to a certain style, visual distinctiveness, comprehensiveness or methodological uniformity. As a result, we can describe their projects using words previously used for museum and gallery art. We also see that although the art changes in some respect, recurring universal principles come up, which the artists observe and which also works from the standpoint of the audience.

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THE BREATH PROJECT

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ABSTRACT

The Breath Project is a public art, ecology and technology project. It is intended to create a new model for peace-as-process by connecting the physical experience of an individual breathing in one location, with direct impact on the environment of a distant other, underlining the true interdependence of all living beings. The core of the project is the pairing of two locations that connects the somatic experience of an individual with functioning ecological restoration. Environmental science in combination with art and technology is a means to make things happen. Recognizing the urgency to create change, artists are integrating art processes into daily life. New cultural practices indicate new social orders – ways of life that emphasize participation, challenge power structures and span disciplines ranging from ecology to community engagement, visual arts to scientific innovation. This project that will bring recognition and response to the urgent need for respectful cooperation between conflicting values and beliefs at a time of critical social and environmental crisis.

INTRODUCTION

As the demand for water reaches the limits of finite supply, ecological resources have become victims in conflicts among nations that share trans-boundary freshwater reserves. In recent years, numerous networks in the international community have formally engaged with local and global environmental groups, becoming fervent champions for the rehabilitation of the world's natural heritage. As climate change, water scarcity and other ecological challenges grow in complexity and urgency environmental stewardship is a key mandate of the UN and other global leadership organizations.

Air, water and energy requirements modify the way in which we may consider the authority of nations, the control of borders and the restructuring of global interdependence. Political theorist Julie Mostov describes this complexity in a world of transnational borders: *"While boundaries are regularly and easily traversed today by capital, electronic information, a wide class of goods, environmental hazards and certain categories of people (privileged passport holders and traffickers), other categories of people ..[and resources] are held hostage within the hard borders of "home" states or blocked at the hard borders of potential "hosts." Today's global economic space of interdependence is one of deep cleavages, severe inequality and new spatial, scalar and temporal articulations of social relations and political association."* [1] The call for what is referred to as "soft borders" is based on the idea that softening borders encourages sustainable resolutions to ethno-national conflicts, economic and social development, problems that do not live separately from the issues of ecological resources. The idea of soft-borders is also a moral consideration, as it is impossible *"not to place this discussion of*

significantly different international and domestic relations within a larger discussion of global justice." [2] Rethinking these relationships is a necessary response to a new kind of *"sustainable and beneficial relationship between human and non-human beings and their environments."* [3] This challenge becomes even more formidable in conflict regions. The fragility, scarcity and degradation of contested natural resources have *"encouraged states to engage in trade-offs in which they agree to accept some limitations on their sovereignty (in the form of international regulations) for expected benefits."* [4] It also demonstrates the ability for the notion of sovereignty to become adaptive.

The purpose of *The Breath Project* is to reveal the global interdependence of everyone. This work is critically urgent. If conflicting communities and cultures are able to carve out pathways to ecological restoration along divided resources, these can be pathways for sharing in other capacities. The installation will demonstrate the ability of the shared action of breathing to have a remediating influence upon the environment, while creating new alliances through alternative, public collaboration.

The Breath Project was inspired by a conversation about the potential for a public art project to act on the critical responsibility to set new paradigms for peace-as-process. It was conceived as a creative nexus for addressing issues of joint resources among conflicting cultures and in response to the volatile inter-religious hatred and mistrust that intensifies stress on waning desert water resources. We are bringing together aspects that are usually treated in isolation – connecting practical-on-the-ground work in a socio-political/environmental axis, with creatively applied informatics. Shared data represents the physical characteristics (temperature, humidity etc.) of shared resources – emphasizing the cyclical continuity in the environment surrounding us. Our collaboration brings the potential for remediating scarce and polluted water resources into a whole system of activities that embrace a wide range of aesthetics and beliefs as the basis for peace processes.

THEORIES OF ECOLOGY

Disparate arenas of study and practice regarding the environment are emerging, that are rethinking relationships between human and ecological systems. Spiritual ecology has emerged as a developing field that joins ecology and environmentalism with the awareness of the sacred within creation. This movement acknowledges the critical need to recognize and address the spiritual dynamics at the root of environmental degradation.

In his pioneering concept of Social Ecology Murray Bookchin, takes a different tack and roots environmental degradation in

social structure. *“More specifically, Bookchin argues, that the domination of nature follows from the domination of human to human as found in certain kinds of hierarchical and oppressive social arrangements.”* [5] Taken further, he writes, “ecological degradation is, in great part, a product of the degradation of human beings by hunger, material insecurity, class rule, hierarchical domination, patriarchy, ethnic discrimination and competition.” [6]

Felix Guattari, in his seminal essay, *The Three Ecologies* (2000) argues that *“The only true response to the ecological crisis is on a global scale, provided that it brings about an authentic political, social and cultural revolution, reshaping the objectives of the production of both material and immaterial assets.”* [7] Guattari proposes that the shared nature of the environment that we live in and the collective impact on it such as anthropogenic climate change, reveal the extent of the commons on which we ultimately depend. Guattari was a psychoanalyst, post-structuralist philosopher (often collaborating with Gilles Deleuze) and political activist, who called for global resistance to what he described as ‘Integrated World Capitalism,’ a psycho-sociology of power and liberation. He perceived that the transformation created by the waning division between the capitalist West and the communist East was leading to the installation of corresponding technologies organizational forms and ‘models of desire’ across the globe. In the opening lines of ‘Integrated World Capitalism and the Molecular Revolution’ (1981), he writes: *“Contemporary capitalism can be defined as integrated world capitalism, because it tends toward a state where no human activity on the planet can escape it. It can be considered to have already colonized all the planet’s surfaces, so that the essential aspect of its expression now concerns the new activities that it seeks to overcode and control.”* [8]

Guattari speaks of *“a globalization of the division of labor, a general capture of all the modes of activity, including those not formally covered by the economic definition of labor.”* Informatics is a driving force in the establishment of this totally capitalized world system: *“The computer revolution considerably accelerates the process of integration, which also spills over into unconscious subjectivity, both individual and social. This machinic-semiotic integration of human labor implies that the mental models of each worker must be taken into account in the productive process: not just their knowledge (or what some economists call their “knowledge capital”), but all their systems of interaction with society and the machinic environment.”* [9] By Guattari’s description, the capitalist production system extends to global dimensions, while at the same time intensifying its grip over humanity to the point of charting out detailed mental models and interaction routines, not only for classes, ethnicities, income groups and local populations, but also for the most intimate behaviors of individuals. [10]

More than ever, the theory of an absolute global system highlights the necessity for soft-border associations as a counterpart to Guattari’s call for resistance to totalizing global systems. It builds

institutions of political association that evolve out of local stakeholder’s needs to manage the use of resources, question the provision of public goods (including systems of taxation and compliance) and [...] checks abuses of power linked to global economic practices and the impact of global externalities (resource depletion, environmental degradation and trafficking). [11]

Environmental peacemaking, which supports a soft-border model, is based on the principal that a common dependency on natural resources and a healthy environment can assist and accelerate cooperation between societies and nations. Following the path of nature to create new forms of human circulation, environmental peace-building draws upon three foundations - economic sustainability, socio-cultural sustainability and ecological sustainability. *“Cross-border environmental cooperation integrates the processes of economic and socio-cultural development where societies benefit mutually from the common management of shared resources.”* Beyond this, environmental co-operation provides a platform for intercultural dialogue that *“enables a process of trust building.”* [12]

PROJECT DESCRIPTION

The Breath project consists of a transportable interactive installation that connects to a water restoration project that will beneficially impact water resources and the communities that share them. The core of the project is the pairing of two locations that connects the somatic experience of an individual in one location with functioning ecological restoration in a distant other, underlining the true interdependence of all living beings. A constant stream of digital data that is collected at both locations by environmental sensor systems translates these concepts into the realm of cyber-physical systems. This data will invisibly drive pictures and sounds projected in the installation that are drawn from the places and communities involved.

GEOGRAPHY

The axis between The Hague, known as the international city of justice and the Jordan River Valley, rich with the history of Christianity, Judaism and Islam, balances the meanings of justice and faith embedded in the project. The Hague symbolically anchors the peacemaking and unifying intentions of the design in relationship to the Jordan River Basin, known as the Fertile Crescent of ancient times. Civilization began in this region, giving birth to technological innovations such as writing, glass, the wheel and the use of irrigation. Rivers have often been construed as the natural borders of states and countries. Yet, rivers can equally be considered places of connection, where the flowing water brings its two banks together. Rivers are associated with the origin and formation of the cosmos and with the ethnographic organization of people.

The Jordan River and Basin is the ecological nexus of three continents: Asia, Africa and Europe and the center of a wetland ecosystem that is the biological heart of the region. In addition to

the importance of the native plants and wildlife, the wind patterns of the region can be tracked through the flight pattern of over five hundred species of migratory birds.

Water politics in the Jordan River basin are extraordinarily complex and include competing claims over water usage, access and problems of salinity and pollution. The river is under enormous threat from excessive water diversion. Ninety-six percent of its fresh water is redirected and the area has been the dumping ground for untreated sewage. Since the early 20th century, numerous attempts to foster cooperation between the countries bordering the banks of the Jordan River have been hampered by regional political conflict. In addition, recent political upheaval in Syria and Iraq has generated almost six million refugees who have fled the conflicts; many of them settling in arid and water-impooverished Jordan, a country of slightly fewer than 6.5 million citizens. The ongoing chaos and fast-increasing mass of refugees needing water has stretched the Jordan River's already diminished resources to an unprecedented low. [13] In partnership with the tri-lateral organization EcoPeace Middle East, we have selected three locations in the Lower Jordan River Basin for our ecological interventions. These interventions will enhance water resources and directly benefit the communities that share them. *The Breath Project* is developed in line with the efforts of EcoPeace Middle East to support its effort to advance both sustainable regional development and create the necessary conditions for lasting peace in the region.

RECENT ART CONTEXT

Artists have been operating in the ecological arena since the Land Art movements of the 1960's and 70's. While land artists such as Michael Heizer, Robert Morris and Robert Smithson were treating the earth as a sculptural medium, other artists such as Helen and Newton Harrison, Agnes Denes, Joseph Beuys and Hans Haacke among others, had very different goals - where their notion of "aesthetics" expanded to restoring the earth. These and other artists saw the necessity of approaching ecological issues systemically. Working with biological ecosystems demanded cross-disciplinary collaborations with biologists, geologists and engineers. Some artists (Haacke, Beuys and Peter Fend) saw the ultimate necessity of enlarging the systemic context to include the political, social and cultural contexts. The work of these pioneers burgeoned in the 80s with artists such as Mel Chin, Pat Johanson, Viet Ngo and with many others, who over the past three decades, have focused on ecosystem restoration through soil and water remediation, mine reclamation, habitat restoration and sustainable agricultural practices along with their links to environmental justice and political policy.

Since the 90s, some ecological artists have employed strategies similar to current trends in 'relational practices' that center around human exchange and social context and social interventions (Platform, Superflex, Jackie Brookner, Susan Steinman, Future Farmers and many more). These artists engage with communities

and the complex social contexts of shared water, air, soil and solar energy. In contrast with current trends of artistic nomadism in the global art market, ecological art practice, as distinct from the more general theme 'environmental art,' is often sustained for long periods of time in the locations in which it occurs. [14]

In the Middle East, noted Israeli artist Shai Zakai, created the *Concrete Flags* project, barrier flags made from excess construction cement poured into a creek near Beit Shemesh, Israel. The flags were made in cookie cutter shapes and set into the stream, calling attention to the ongoing pollution issue and helping to raise money for clean up efforts to remove cement debris from the creek bed. Her work through the ecoart group that she has established focuses on 'Activism' as art and ecological activism. Artists in the digital arena have also been addressing ecological and environmental issues, often through sound art and data sonification. It is important to mention the work of Andrea Polli and her work on sound, data and the visualization of air. Although her work does not work on the remediation of air, the aesthetics of her work raise awareness about the environment in critical ways. Similarly, Ned Kahn's work as an environmental artist and sculptor captures the invisible aspects of air in order to make it visible in exquisite ways.

Many artists have been working in the realm of border politics with focus on the implications on shared resources. Artists working along the US/Mexican border have developed projects that provide a potent example of the provocation of cross/border issues. Electronic Disturbance Theater, with their project *The Trans-Border Immigrant Tool*, illustrate the power of the performative "disturbance" of GPS technologies in a mobile phone programmed to lead illegal immigrants to stored water reserves, while providing poetry as spiritual nourishment along the way. Ricardo Dominguez, a co-founder of ETB, calls the work of electronic civil disobedience, 'Activism,' a practice that grew out his earlier work with Critical Art Ensemble. On a different border, *Paparudo*, was a public performance by the artist, Monsiuer Moo, as a re-enactment of a 1946 seeding of the clouds with water along the Canada/US border. During a drought, the US introduced water into the clouds along the border and Canada complained that they were deprived of rain by their American neighbors. After this event, under the mandate of the UN, Canada sanctioned the R.Q.c.P-43.r1 treaty legislating control of the artificial creation of rain in North America. [15]

CONCLUSION

As global climate change becomes more than critically urgent, the systemic entanglements among the oil economy, current wars, contaminated air and ever scarcer and more polluted water resources around the world, are clearly revealed. Engaging with environmental peace-as-process demands new partnerships. Art in collaboration with environmental science, technology and organizations that are dedicated to peace processes is a means to make things happen. These practices indicate the necessity

for less segregated approaches to problem solving – new aesthetic paradigms, that emphasize participation, challenge power structures and span disciplines ranging from ecology to community engagement, from visual arts and scientific innovation to activism.

CORE TEAM BIO

The core team of *The Breath Project* is made up of Hana Iverson, a media artist whose work with video and public installation is combined with a focus on mobile art, locative technologies and collaborative community projects; Ecological artist Jackie Brookner, whose work brings plant-based water remediation for parks, rivers and wetlands together with habitat restoration, landscape sculpture and active community collaboration; and Dr. Pramod Abichandani, an electrical and computer engineer whose research interests are centered around data-driven decision-making based on mathematical programming, linear and nonlinear systems theory, statistics and machine learning.

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YOUR OWN REAL LIFE ENVIRONMENT AS A COMPUTER GAME

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Children like to sit behind the computer. Parents are sometimes worried about that. Children mostly see the positives sides of working on the computer. Parents would like their children to spend more time playing outside. How can you use the children's interest in the computer to get them to be more active outside? And how can you motivate children to become more creative in working on the computer than just playing games?

In the media art project *Connected* I combine working on the computer with being active outside. The project consists of a series of workshops for children from about nine years old, where exploring their own daily life environment as well as learning basic skills on the computer are the main starting points.

In the workshops children are stimulated to discover and explore their own daily surroundings with the use of a photo camera. The material that is made and collected during the workshops, is used to create a computer game.

The project *Woerden Connected* takes place in the small town of Woerden in the Netherlands. This municipality consists of the city of Woerden as well as several villages that are joined together into one municipality. Children often only know their own part of the municipality. Many of the children who are living in one of the villages rarely visit the other villages of the same municipality. In the project "Woerden Connected" workshops are taking place in each of the villages and the main town of Woerden. In each location children are doing the same workshop in which they collect material about their location. During the workshop the material is merged together into a single computer game.

In the workshops I am using a computer game which I programmed in advance of the workshop. Together with the children I am going to fill the game. The game is based on the classic computer game Super Mario. In the game you can jump through a landscape and collect coins. You use a character, seen from the side, to run and jump in the game. The landscape is made up out of photos, which are made during the game. The character (Mario) are the children themselves. Each child who takes part in the workshop is photographed in different positions: standing, walking, jumping. The photos are used to create an avatar for the game. In this way the children become a part of the game. When playing the game they are jumping through the surroundings in which they were active in real during the workshops.

During one of the afternoons I explain the children that we need coins, which the player can collect in the game. "Diamonds," the children correct me. We are on a farm that afternoon. When I look around me I see lots of objects that could be photographed and used as coins in the game. It is my role to make the children discover these objects themselves. "Do you see anything here that you could

use as a coin, as a diamond, in the game?" The children immediately run away to take photos. They see lots of things that could be used in the game. About half an hour later they are back at the computer with the photos already on the screen.



Fig. 1: Screen shot of the computer game *Woerden Connected*, 2014, Cym. © CYM 2014.

The next step is to edit the photos. We are using the program Paint. For many children in the workshop it is the first time that they are working with Paint. Of course Photoshop offers many more possibilities to edit photos, but I always let them start in Paint first. For me it is important that they learn to use programs which are also available to them at the computers at home and at school.

To be able to use the objects which they photographed as coins in the game, the background on the photos needs to be erased. Only the object should be left on the image. This turns out to be a difficult task. The children are working on it very seriously, but find it a tough job.

They ask if they can draw something themselves. I explain them that for this project we only use material from our real life surroundings. The goal behind the workshop is to connect the different areas of the municipality together and turn them into a computer game. The children are not listening. They are outside again already, to make more photos. They have decided that editing the photos on the computer is too complicated for now, they are much rather outside.

There also needs to be a monster in the game, an enemy. A game without an enemy is not a real game, they all agree on that. I explain the children that in that case they need to find something outside, that can be used as an enemy, since everything we use in the game needs to come from our real life surroundings. Together the children decide that the cat that lives at the farm is the perfect enemy for the game. The children run outside and all of them make

almost the same photo from the cat, that is patiently posing for them in front of the house.

To turn the friendly animal into an enemy for the game, the cat is edited by the children in Paint. The children happily make use of the many shapes that the program offers, which they have discovered very quickly. The cat is surrounded by lightning bolts and text balloons. The children enthusiastically show each other the results. After editing the photos we are going to put the elements together to create a real game. In order to do so we use the program *Game Maker*. I show the children how they can place platforms and coins in the game. By putting platforms into the game on which you can jump, you can create a kind of path through the game, a route for the player. Just like editing the photos, also the placing of platforms turns out to be a difficult task. A few children discover that instead of placing platforms, you can also remove platforms. In that way a hole occurs. When you fall into a hole while playing the game, you die. The children like that and all of them make a hole in which you can fall when playing the game.



Figs. 3, 4: Children taking photos and editing them on the computer for the game *Woerden Connected*. Photo: Cym. © CYM 2014.

I am trying to let the children discover as much as possible by themselves. One of the children discovers something and the others ask “How did you do that?!” It isn’t until the end of the afternoon that one of the children discovers that you can do much

more than just placing objects and coins. You can also place enemies in the game! Suddenly it becomes interesting. The children place so many enemies in the game, that it becomes practically impossible to play the game. The children are excited and proudly show that if you know where to click, you can still play the game. The workshop is finished. The children ask if there will be another workshop. Three afternoons was much too short.



Fig. 5: Screen shot of the computer game *Woerden Connected*. In the game you can jump on buildings, something that is not possible in the real environment. 2014, Cym. © CYM 2014.

The game is finished when all the workshops are finished. I am merging the materials from the different workshops together into one game. When playing the final game, the children are jumping through the results of the different workshops. In that way they are not only seeing their own daily environment back in the game, they are also seeing the environments of the other children in the same municipality back in their own computer game.



Fig. 6: Screen shot of the computer game *Art Hub Connected*. In the game the real walls of the Art Hub building are used as the background of the virtual game. 2014, Cym. © CYM 2014.

In October 2014 I created a similar game during my time as artist in residence at ISEA2014. Instead of creating a game together with children I turned the Abu Dhabi Art Hub into a computer game. The staff members became the avatars in the game. The images on the walls of the real Art Hub became the coins that you can collect in the game. The game was presented as a huge installation inside Art Hub. As a backdrop the background of the game was printed as a huge lifesize background, creating a new layer for the game. The virtual game was presented inside a room with a real life virtual environment, inside the real environment where the game was made. Visitors would first enter the real life building and then continue playing the game inside a lifesize virtual environment inside the Art Hub building. Besides the presentation at Art Hub I also presented the game at the Abu Dhabi Art Fair at the Art Hub booth, which took place during the same time as ISEA2014. Inviting visitors to play the game at the Abu Dhabi Art Fair led to many interesting conversations. Interested? Visit www.playconnected.eu

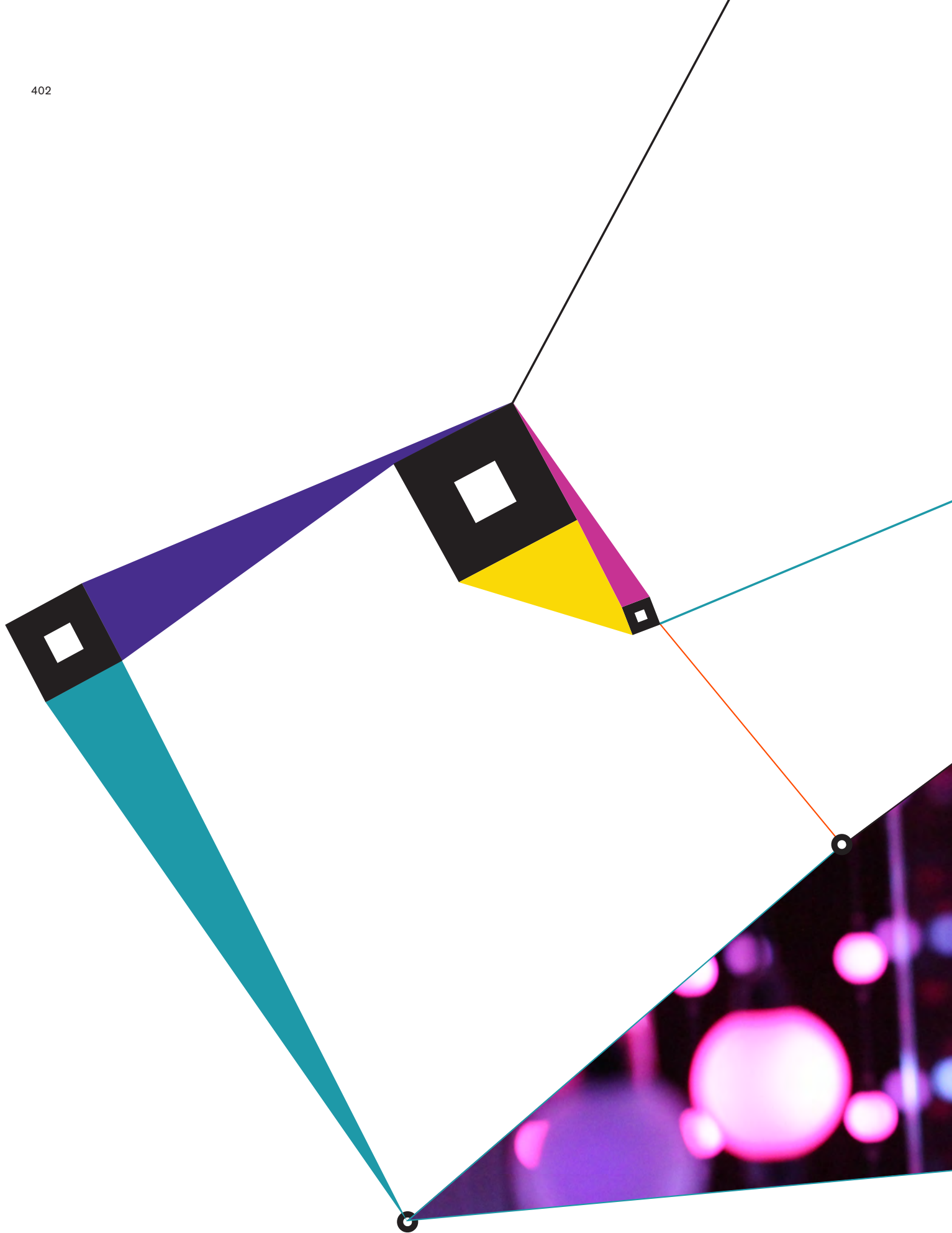


Fig. 7: Children playing the computer game *Art Hub Connected* at Abu Dhabi Art Hub during ISEA2014. Photo: Cym. © CYM 2014.



Janet Echelman's Netting Sculpture, Photo by Wilson Tang, Under CC-BY-2.0





STREAM 6

PUBLIC SPACE



DO WE MARK TIME OR DOES TIME MARK US?

Angela Davies, Wrexham, Wales

ABSTRACT

The paper presents how creative technologies were explored to create site-responsive immersive installations within the fabric of the architecture of Chirk Castle, Wales, to correlate sound with light. It explores how the performative, immersive exhibition simulated a new perception of place, fusing together and reflecting a moment in time within Chirk Castle, abstracting a connection to the landscape. It will discuss how themes of time and place were explored in response to the architectural framework and the geologically - sculpted landscape of Chirk Castle, during an artist residency located at the castle. It will discuss how technologies, materials, process and scale have been explored to create the sensory environments within *Golau (light)* – a site – responsive exhibition. Intrinsic to this residency, was the collaboration between artists working from different disciplines (film, dance and sound); this served to enrich my personal practice and generate multi-sensory and multidisciplinary responses to the memory of place.

The paper will reflect upon cultural identity of place and self and how, by embarking on these poetic geographies, I begin to define my place in time. It will further explain how these traced networks were transcribed into the art forms installed within *Golau*, to create a situation and moment for collaboration in response to communicating landscape as identity.

BOUNDARIES OF TIME

This paper will present the methodologies and collaborative approaches to creating a site-responsive exhibition and performance that I directed within a heritage site in Wales. This will be discussed in three parts; it will discuss the background and the context of the research, using examples of my own work, it will specifically discuss the technology used for one of the pieces - *Eirlysiau*. Finally, I will reflect on the resulting public event.

LANDSCAPE LINES

AAs stimulus to prompt an investigation into my location, I reflected on Christopher Tilley's '*Phenomenology of Landscape*,' where he states: "*The landscape is the fundamental reference system to which individual consciousness of the world and social identities are anchored.*" [1]

I explored the landscape of Wrexham, North Wales during a residency at Chirk Castle – a medieval fortress in North Wales on the border between Wales and England. [2] I considered the boundaries between past and present landscapes and the territorial space defining the borderline town of Wrexham. For this residency, I invited a group of artists to participate in my thematic, resulting in a number of site-specific installation and performative works that emulated my experience of the landscape and responded to the fabric of the castle.



Fig. 1. Offa's Dyke Path, 2013, Angela Davies, Photograph, © Angela Davies.

Figure 1, references a small stretch of Offa's Dyke - a geographical border defining England and Wales. I traced a section of the 170 mile defendable terrain during my investigation, layering time to reconstruct patterns of human behavior across the earthwork boundary. Michel De Certeau expresses, 'mythic geographies' allow us to see the ways in which representations of space and place are intimately bound up in the 'nexus of power-knowledge.' [2] I considered space and place systems within the landscape as I traced footsteps along the Dyke. In an *Archaeology of Knowledge*, Michel Foucault argues: [...] *the problem is no longer one of tradition, of tracing a line, but one of divisions, of limits; it is no longer of lasting foundations, but one of transformations that serve as new foundations.*" [3] By embarking on these poetic geographies, I reflected upon contemporary narratives that drew upon traditional values, to consider geographical identity. To me, this conveyed an emerging cultural dialogue between past and present. It was through these experiences that the work was conceived and translated within the castle, to subsequently inform multi-disciplinary responses, which are represented within the exhibition at Chirk Castle.

Golau Map (Fig. 2), translates from Welsh to light, it unravels a drawing of place. The translation of ancient pathways are interwoven with a personal navigation of the landscape, to illuminate permeable boundaries and thresholds of space that reflect physical geographical boundaries and passages of time. The new network lines that have been created act as 'new foundations,' to represent my place in time.

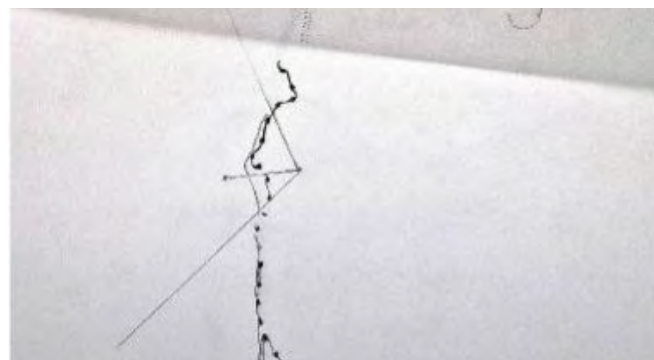


Fig. 2. Golau Map, 2014, Angela Davies, Drawing on paper, © Angela Davies.

MULTI-DISCIPLINARY COLLABORATION

Creative technologies had a strong role to play during the multidisciplinary collaboration. Within each of the collaborator's work there was an aesthetic that mirrored an element of my practice. *Golau Map* (Fig. 2) was shared with collaborators, which subsequently informed the multi-sensory response, represented within the exhibition. The interdisciplinary exchange, involved taking chances and risks within the castle (Fig. 3) – responding intuitively to place. One artist's response to the other informed an acknowledgement of the fabric of the space. It is the system of navigating space to discover the hidden intricacies of life that connects to my work. These elements were considered, interpreting physical landscapes to create new landscapes. This therefore enabling the user to navigate and explore the interior of the castle, emulating an experience of walking within the landscape. Whilst each of the exhibits will be discussed, there will be a particular focus on *Eirysiau* - a sculptural sound and light installation and the technology explored and applied to create this site-responsive installation within the castle.



Fig. 3. Chirk Castle, 2013, Angela Davies, Photograph, © Angela Davies.

EIRLYSIAU (SNOWDROPS) INSTALLATION

Eirlysiau (Snowdrops), is an ephemeral site-responsive installation that captures an experience of nature - in relation to light and water. It is constructed of 50, suspended vertically-aligned sculptural snowdrops. Each snowdrop sculpture (Fig. 4) was embedded with an LED and suspended within the 'murder-hole' space within the tower of the castle. The installation displayed fleeting light within the tower, suggestive of an illuminated field of snowdrops inside a manmade structure. Landscape lines were etched into glass using CAD technology and water jet cutting. Thus revealing physical and illusionary networks of interaction with the landscape, to illustrate the passing of time. The fleeting light ignited each of the 50 individual lenses. Thus projecting the luminal line of place to magnify borders and threshold spaces in relation to political and geographical border. The cyclic light traveling through the installation interconnected place and landscape to give an illusion of time.

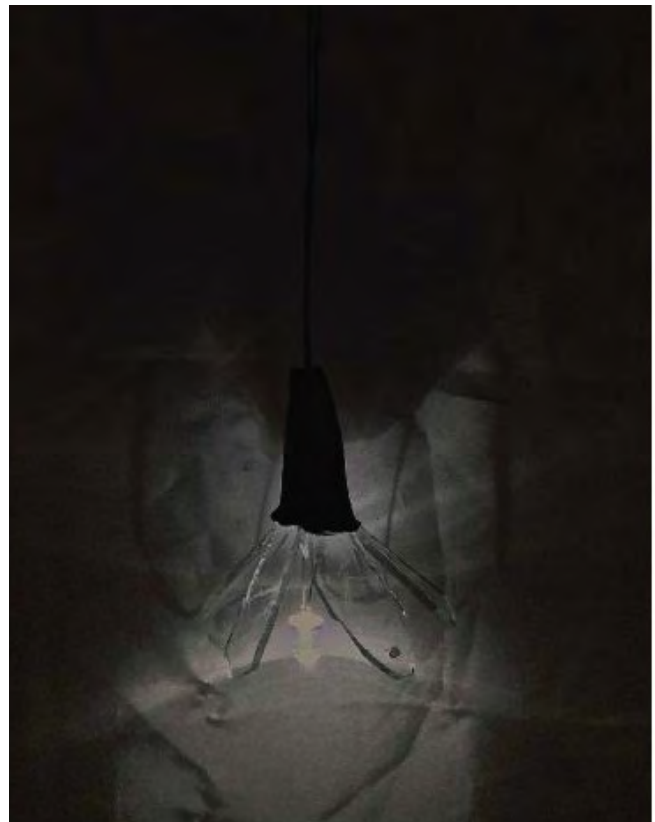


Fig. 4. *Eirlysiau (Snowdrop)* sculpture, 2014, Angela Davies, porcelain, glass, LED, © Angela Davies.

To orchestrate a fluid flow of light through '*Eirlysiau*,' exploration of coding and programming was implemented to correlate sound with light. To enable the work to interact with the environment in this way, I worked in collaboration with Ant Dickinson. It was necessary to draw upon his expertise of the visual programming, since it reached beyond my experience of using coding with electronics and arduino.

Pure Data Extended programming and Arduino microprocessing were used to fuse sensory elements. A custom made patch was created and written in Pure Data by Ant Dickinson (Fig. 6). This was implemented using the Pduino library. Pure Data is a visual mapping programming tool which allows networks and links to be connected and expanded. This was initialized through Pduino, thus allowing access through the inputs and outputs on an Arduino micro-controller from within Pure Data. To enable this to function, to communicate with the Arduino, *Firmata* was installed on the Arduino. To emulate a "twinkling" effect with the lights, a noise generator was used to create irregular fluctuations. This subsequently connected sound and light, ultimately generated by sound. This was sent to the Arduino and was sequenced across the 6 analog/ pwm outputs. Implementing Sinewave Oscillator and delays enabled the light to be "surged" across the installation. To support the fading light across the lights, a low frequency sine wave was rectified.

borders; boundaries and place systems through the castle. Thus resulting in an 'in-between' expression captured in film. This simulated a poetic response, which was characterized through the film projection and installations that were sensitively integrated within the tower. Through the three moving image installations: *Lateral Flight*, *Meander* and *Carved Through Stone*, the dancer, conveys movement, suggesting an illusion of time. *Lateral Flight* is a minimal ephemeral time piece where the film projection intensifies during the day.

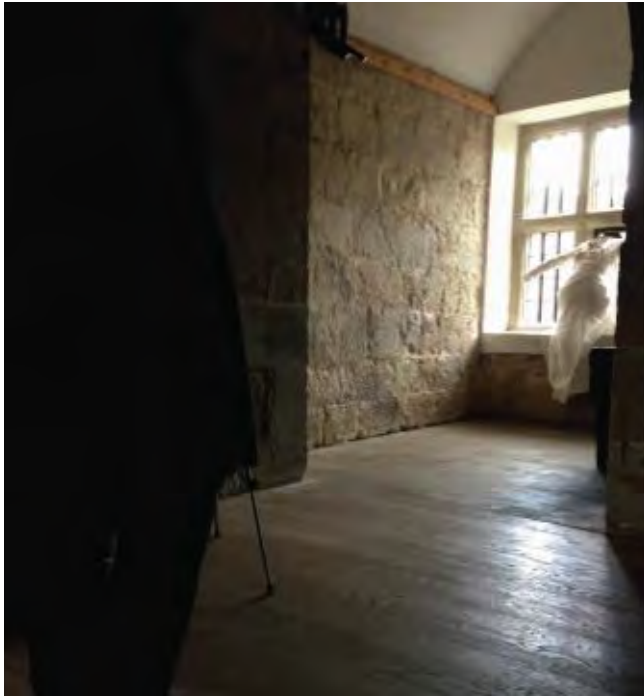


Fig. 8. Live Performance, Chirk Castle, 2014, Angela Davies, Photograph, © Angela Davies.

To emulate research themes, there were live performances (Fig. 8) of dance and sound, on the opening of the exhibition, when a series of responsive performances took place across the tower. There was an interplay with the static installations and the live performances and the interaction with each of the light, sound and moving image installations. These captured the viewers' attention, so that they become a voyager on a transcendental journey through the castle.

CONCLUSION

The rhythmical and performative experience of walking within the landscape was transcribed back into the space of initial inquiry, to create the immersive experience of dance, sound, light and moving image installation. The exhibition displayed an interplay between environment, users and the static and live performances. In reflection to the opening quote and from my perspective, as the viewer walked and meandered in and through the castle, an experience of the landscape unfolded. I believe this sought to challenge the viewer's perceptions of their surroundings, forcing

encounters with barriers and boundaries between time and space through the act of engaging in this layered experience. In reference to viewer experience, there were mixed feelings about the contemporary interpretation of heritage being displayed within the context of the castle. Some reviews were positive and people were curious and inquisitive about the curation of the contemporary art exhibition and the multi-sensory experience. In contrast, some users comments conveyed an uneasiness with the exhibition and found the interpretation challenging. Finally, the opportunity to engage in multi-disciplinary collaboration with other artists was integral to materializing my thematic. The works occupied a systemic network; for the viewer to navigate within the tower. The immersive audio-visual narrative, echoed a spatial dimension, that united themes of place and time, fusing together a multi-sensory experience of 'my location' within the architectural framework of Chirk Castle.

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OVERLOAD/ABSENCE: THE COLLAPSE OF SPACE TO SURFACE IN REPRESENTATIONS OF URBAN SPACE

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ABSTRACT

As public space is rapidly diminished through gentrification and privatization it is 'enlivened' by the introduction of large-screen moving images, digital advertising and other mediaization. This is an environment of alternating overstimulation and anonymity in which the hyperactive and featureless landscapes, seemingly opposites, both prioritize the *skin* of architecture and is a manifestation of an intense preoccupation with surface. Using New York City as an example of an older city in evolutionary transformation, the paper will contrast this established urban paradigm with an emergent city like Dubai, where the architecture of surface has been introduced into a 'tabula rasa' environment unconstrained by historicism or gradualism. This paper will also examine the perceptual shift from space to surface in environments of overload and absence and also look at how surface has been used by artists to create new representations of urban space.

FROM SPACE TO SURFACE

The contrast is stark: a nexus of avenues so illuminated by signs and video that the uplight can be seen from an airplane. A few streets away the landscape flattens out to corridors of corporate towers anchored by a repetitive streetscape of banks and chain stores. These hyperactive and featureless environments, while seemingly opposite, both prioritize the *skin* of architecture. This is urban space stripped of sense of place as it is amplified by intrusions of electronic media. As more established cities lose the idiosyncratic visual codes that create a complex geospatial identity, emergent cities embrace the architecture of surface. This visual landscape exhibits the characteristics of 'non-space' described in Marc Augé's book *Non-places: An Introduction to Supermodernity*. It is "space that cannot be defined as relational or historical or concerned with identity and is thus devoid of emotion and memory." [1]

These "spaces of circulation, consumption and communication" lack the organic growth and dynamic chaos that once typified the city. In addition, globalization and the constant mediation of electronic devices causes an individual, in Augé's words, to "*live rather oddly in an intellectual, musical or visual environment that is wholly independent of his immediate physical surrounding.*" This extension of physical and psychological awareness in media has been described by William J. Mitchell as "*the electronic present continuous.*" [2]

The hyperactive landscape of Times Square-type zones and featureless business districts, are perceptually similar – superficial (in the sense of a reduction of nuanced and dimensional space to a two-dimensional plane). This paper will consider the shift from space to surface in historical and emergent cities and examine how the visual vocabulary of surface may be used in formulating new representations of urban space.

THE EROSION OF MEMORY

Landscape is history: memory is inscribed in place. As familiar places vanish, memory becomes myth and an ordinary place is seen through the lens of nostalgia. It is vernacular buildings that create a neighborhood feeling.

In New York, these endangered and demolished landmarks are memorialized in *Jeremiah's Vanishing New York* blog. Jeremiah Moss compiled a 'Master List' of businesses that have disappeared since 2001 and estimates that 6,926 years of history have been lost. [3] Many of these storefronts were the product of an individual sensibility evolved over time: visually unique and evocative of an owner's personal history. It's a cliché to describe upscale stores as having collections 'curated' by the owner. Yet the contents of these neighborhood stores are truly curated, representing a holistic sensibility that is consistent in signage, architecture and merchandise.



Fig 1. Signage, 1996-2001, photograph, Annette Weintraub.

Quirky and eccentric, these shops in their lively use of color, typography and unorthodox construction materials are a form of living folk art.

THE ARCHITECTURE OF REMOTENESS

In contrast to a model of lively street life, high-rise high profile trophy buildings minimize the importance of the street. Designed to be seen from afar, these totems brand the skyline, emphasizing the broad vista over the close-up. Intentionally remote, they are aloof from the city even as they use it as a signifier of their importance. An example of the rejection of street for vista is a Frank Gehry building in lower Manhattan. The second tallest residential tower in the Western Hemisphere, this 76-story silvery column is set on a squat five-story brick base. On the building website, there are no images of the building at street level. Promotional photographs emphasize the tower's sculptural quality by focusing on its crenelated surface or show it in a panoramic establishing shot of the skyline.



Fig. 2. 8 Spruce Street, 2014, photograph, Annette Weintraub.

The upper residential floors are delicate, the silvery skin beautifully modulated in the changing light. At street level, the plain base contains shops, a school and hospital; visually unrelated to the tower that rises above. The base and tower, public and private zones, are separated in blunt economic terms: bespoke design for the tower, a generic box for the public. The building expresses the contradiction of being in the city yet set apart from it. Augé observed that the cinematic long shot captures the aesthetic of non-place, a psychological distancing that expresses ambivalence about the messiness of urban space. [4]

THE PAST AS PASTICHE

Temporal estrangement occurs when fragments of the architectural past are separated from their original context as when developers demolish a historical structure but retain a decorative element as a cosmetic ‘amenity.’

The destruction of St. Ann’s church (1847) to construct an NYU dorm in the East Village of New York City is such an example. All that remains of a lovely Victorian Gothic stone church is a slice of the façade, backed up against a generic brick structure unrelated in scale, materials or geometry.



Fig. 3. St. Ann’s, 2013, photograph, Annette Weintraub.

The amputated fragment is out of place and doubly inauthentic. A failed ‘preservation’ strategy has turned a distinguished building into an ornamental quotation that makes its prosaic replacement appear even more impoverished. The church has been flattened into a single surface; this is the past as pastiche.

THE ROMANCE OF RUINS

As established cities are stripped of history, there is a temptation to romanticize the past. This is a psychological mechanism for confronting loss. There is voyeuristic satisfaction in meditating on the remnants of a vanished culture while enjoying the spectacle, as in Piranesi’s 18th century etchings of decaying Roman ruins. ‘Urban exploration’ is a way of connecting with the past and experiencing a vicarious authenticity of place.



Fig. 4. <https://www.flickr.com/photos/memoriesbymike/>, 2013, photograph, Creative Commons license.

Transgressive acts of incursion into inaccessible places such as abandoned power stations, train tunnels and sewers are photographically documented in what is now ironically called ‘ruin spotting’—a term that expresses the complexity of a guilty pleasure. These landmarks of early industrial architecture contrast starkly with the conventional urban landscape. Built on an imposing scale, they are visual confirmation of a vibrant industrial machine; they expressed boundless confidence in the ascendancy of capitalistic culture by referring to the magnificent public works of ancient times.

Paul Raphaelson’s photographs of the abandoned Domino Sugar Refinery in Brooklyn convey the duality of former grandeur and current desolation. At its peak, Domino refined over half the sugar used in the United States. Now, although partially landmarked, the site will largely be replaced by a residential tower. Raphaelson’s images show the immense halls and intricate mechanical workings of the plant. The austere open spaces elevate its utilitarian function and its patinated abandoned machinery remind us of the temporality of even the most ambitious undertakings. [5] The anxiety about time expressed by contemplating ruins or imagining the utopias of the future is a way, in Augé’s words, to “grasp in the present a lack that structures the present moment by orienting towards the past or the future.” [6]



Fig. 5. Domino Sugar Refinery, Brooklyn, 2014, Paul Raphaelson, photograph, image courtesy of the artist.



Fig. 6. Domino Sugar Refinery, interior, 2014, Paul Raphaelson, photograph, image courtesy of the artist.

RENDERING AS REALITY

Architectural renderings and depictions of urban space in video games present opposing images of the city: utopian vs. dystopian and real vs. fictive even as they use a common set of 3D rendering conventions. Video games use iconic New York locations in a filmic way, employing a shorthand of easily read symbolic visuals including graffiti, yellow taxis, dimly-lit industrial streets and glowing signage. The strong sense of urban atmosphere of these establishing shots moves the narrative forward as much as the game action itself: this is the city as stage set.

The image of New York locations in films such as *Taxi Driver* or *Escape from New York* is clearly related to the New York of *Grand Theft Auto IV* and *Crysis 2* video games. As games critic Jim Rossignol has noted, "New York City has become gaming's ideal and idealized urban environment and it has done so by becoming re-fictionalized and reimagined. The finest example of a city yet given to gaming, that of *Grand Theft Auto IV*, isn't really New York at all and yet it is more like New York than ever before." [7]

While the city in *Grand Theft Auto IV* has been art directed with Edward Hopper-like solidity and depicts a somewhat contemporary New York, *Crysis 2* remakes New York into a ravaged city of the

future evocative of Piranesi. Impressionistic in approach, with richly detailed textures and extreme level of detail, it severs foreground and background, placing chunks of skyline rendered in extreme perspective outside of the field of action. The use of haze and atmosphere references painters like Turner and Caspar David Friedrich, creating a feeling of melancholic despair. This game presents a dystopic vision of the city; aestheticizing devastation much like ruin porn photography and depicting the city in extremis, in a dark future of social, political and ecological deterioration.



Fig. 7. *Grand Theft Auto IV*'s Star Junction, 2008, video game still, image courtesy of Rockstar Games.



Fig. 8. *Crysis 2*, 2011, video game still, image courtesy of Crytek.

Architectural rendering is capitalism's "good" twin to the "evil" twin of video games. Video games depict claustrophobia and grittiness; architectural renderings emphasize spectacular vistas and improbable pastoral elements. Well-ordered compared to the deliberate disorder of games, these representations are utopian, presenting the city as gleaming surfaces and clearly framed viewpoints.

Architect's drawings conflate wishful thinking and practical information. These renderings are not only a way to view a building in situ before construction, but are an aspirational sales tool that promotes an urban lifestyle. Flipboard's *Skyscraper City* is a catalogue of this seductively rendered aesthetic. It becomes difficult to tell if one is looking at a photograph or a rendering, since a seamless set of conventions of surface emphasizing

reflected light, strong diagonals and glittering materials are ubiquitous in architectural, gaming, photographic and filmic depictions of urban space. [8] Architectural renderings lack the chaos and human presence of video games and their emotional dimension. They depict a world of surface perfection in which the anarchy and confusion of the city is sanitized and spatial representation is condensed to a set of conventions; space is downsized to surface.

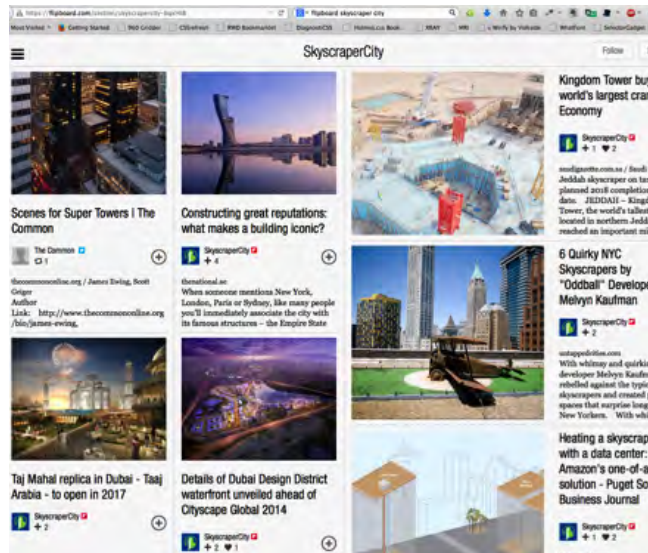


Fig. 9. Flipboard's Skyscraper City, 2014, screen grab, image courtesy of Flipboard.com.

EMERGENT URBANISMS

While the shift from space to surface in urban centers like New York is dislocative, emergent cities like Dubai present a different model. Rather than displacing the past, the architecture of surface has been implanted in a tabula rasa environment unconstrained by the political gradualism and physical (or often financial) limitations of established cities. There is a contrast between internationalist and indigenous architectural forms, but there is little 'middle distance' of existing development to disrupt. The modest scale and indigenous materials of traditional districts and the bold novelty of new construction are set apart geographically and temporally.



Fig. 10. Dubai from Vu's Bar, Emirates Tower, 2013, WatchfulMind, photograph, Creative Commons license.

Very much as in Las Vegas (also best photographed at night), accelerated urban development takes place in an 'empty' environment that doesn't displace traditional visual codes. The trophy buildings of Dubai's iconographic skyline are measured only against each other and world records for height, scale and daring and the luxury of seemingly endless space permits experimentation and hyper-sized projects that would be unthinkable and politically impossible in older cities.



Fig. 11. Dubai at Night, 2010, Kamel Lebtahi, photograph, Creative Commons license.

While 20th century cities contest radical change and Dubai embraces it, it is in China, where ravaged historical districts and new construction are cheek-by-jowl, that the violent uprooting of visual codes and established social communities is clearly articulated. Demonstrating neither the negotiated shifts from space to surface of New York or the exuberant expansion of Dubai, the rupture in China reads as entirely brutal.



Fig. 12. Demolition in Shanghai, 2010, Bert van Dijk, photograph, Creative Commons license.

BEAUTY IN NON-PLACE

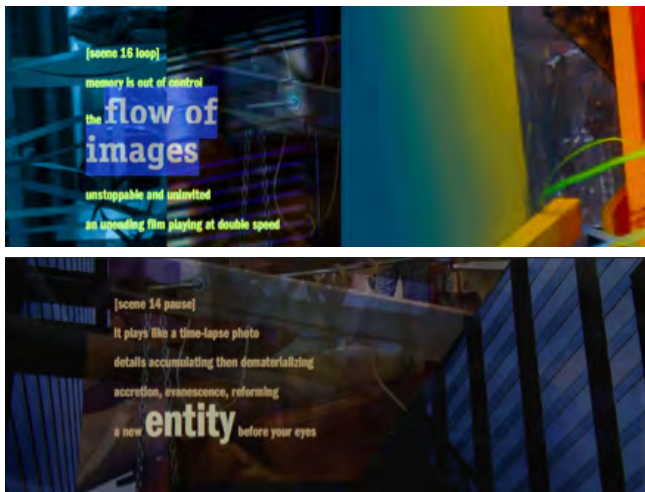
Marc Augé described the "dilemma of artists doomed to seek beauty in non-place." The reshaping of the city as surface is an opportunity for rethinking representation of urban space. Perhaps

an urban landscape focused on exteriority is more readily understood in extreme close-up or zoomed out into the global perspective of Google Maps.

THE GRANULAR LANDSCAPE

The increasing blandness of once richly complex streets has caused me to view at urban space differently. Pictorial elements that read as compelling are not the visuals so emblematic of the environment of non-place, but small material details that convey a granular sense of the complexity of the whole. It is the middle distance that reads as banal: the close-up and extreme vista both contain information and reveal underlying structures that can be extrapolated into a new mapping of the city. To explore this notion of city as surface, I used a series of generic urban visual elements to create a series of animations exploring surface. The panning movement in these animations correspond to the experience of optically scanning a vista, placing the viewer in the landscape, as in an establishing shot in film. *Slide Stories* is a web-based work that uses the insignificant detail of urban landscape to construct underlying narratives of urban space. These small image fragments, meaningless in isolation, in aggregate construct sense of place. [9]

Slide Stories is composed of seven sequences, each of which explores a different visual and thematic narrative of urban space. Each scene of *Slide Stories* consists of an extreme horizontal panorama, one or more overlay images, a text and a track of ambient sound. As the animation loops, the image is reframed and the path and juxtaposition of text and image changes so that the viewer experiences a different conjunction of elements. The panning is slow and out of phase so that each iteration reveals a slightly different part of the whole.



Figs. 13, 14 *Slide Stories: Blink* (screenshots), 2012, Annette Weintraub, Internet project, Image courtesy of the artist.

The scenes of *Slide Stories* vary in visual theme and underlying narrative and explore issues of materiality, spatial geometries, the transformative effect of artificial light; the warmth of organic

materials; and the transience of the urban environment. Using devalued commonplace material detail, *Slide Stories* poetically reconstitutes urban space through surface incident.

PATTERNS OF ORGANIZATION

Satellite images present a global perspective; a flattened view of earth that renders architectural elements graphic. This perspective shift emphasizes the commonalities of structures; most buildings are rectangles when seen from space. GoogleMaps turns space into surface: height and volume are undifferentiated, while color and pattern are critical. *Every Outdoor Basketball Court in Manhattan* (2011) is a digital print by Jenny Odell from her series Satellite Collections. These prints extract a set of architectural structures of similar function from Google Satellite View and aggregate them in a set that articulates their incremental similarities and differences.

As Odell states, "*The alienation provided by the satellite perspective reveals the things we take for granted to be strange, even absurd. Banal structures and locations can appear fantastical and newly intricate. Directing curiosity toward our own inimitably human landscape, we may find that those things that are most recognizably human are also the most bizarre, the most unlikely, the most fragile.*" [10]



Fig. 15. *Every Outdoor Basketball in Manhattan*, 2011, Jenny Odell, digital print, Image courtesy of the artist.

Odell's images are painterly geometries, abstractions that play with small contrasts of shape and color. Detached from context, the images show identical structures whose marginal differences collectively reveal much about culture, industry and economics; even as they remain indecipherable they charm us with their eccentricity.

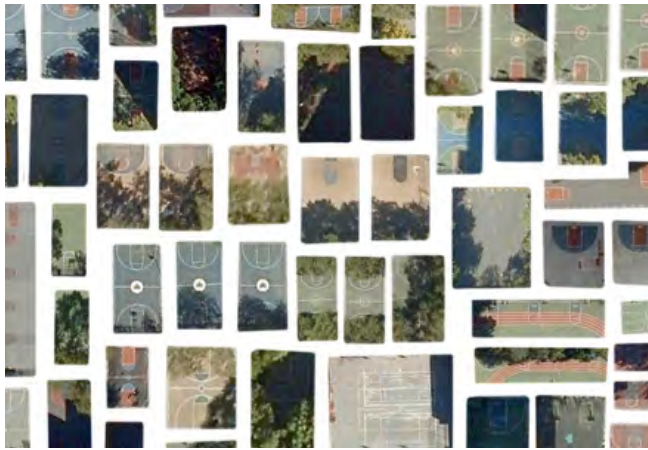


Fig. 16. *Every Outdoor Basketball in Manhattan (detail)*, 2011, Jenny Odell, digital print, Image courtesy of the artist.

ANIMATING SURFACE

Dynamic movement is an essential characteristic of urban space. There are characteristic urban rhythms: the energetic streaming of traffic or the flocking movements of pedestrians in space. By obliquely capturing this dynamism, the underlying patterns of a space can be revealed. Noah Klersfeld's video work, *Times Square (NYPD)*, breaks up the action of several video clips into the tessellations of a rotated grid; It presents a slice of the city in fragmentary glimpses seen through a banal section of chain link fence. The moving image elements are drawn from one or multi-channel videos, small slices of which are placed in selected negative spaces of the chain link. The effect is of a constant play of solid and empty, static and dynamic, extended in time.



Fig. 17. *Times Square (NYPD still)*, 2014, Noah Klersfeld, video (5 minutes), Image courtesy of the artist.

Klersfeld describes his work as "temporally redistributing the activities taking place on a snowy afternoon in New York City. *"Focusing on the city's epicenter of tourism and media saturation, the video unifies the vast array of activities by confining everything (people, snow, cars, trucks, buses, digital signage) to a series of identical "viewports." The result is a spatially ambiguous depiction of the urban environment, weaving together multiple timeframes*

into a singular form." [12] By inserting slivers of video into a static field, Klersfeld transforms the haphazard movement of the street to surface, encoded so recognition hovers barely above the threshold of perception.

REIMAGING INDETERMINATE PLACE

Perhaps it is not beauty that artists seek in Augé's indeterminate place, but a lens through which to reimagine place in a devisualized landscape. In an urban environment stripped of history and cultural identifiers that proudly embodies the stylistic conventions of real estate marketing and 3D rendering, sense of place is provisional. The transitional spaces of circulation, consumption and communication that Augé saw as emblematic of non-place are no longer merely peripheral or connective, they are the substance of our space – it is as if the once interstitial spaces had absorbed into themselves the islands of matter that they connected. Artists' responding to the phenomena of non-place are using fragments of visual incident, variation in material surfaces, analysis and extraction of underlying pattern of the landscape to reformulate a vision of urban space that explores its essential dynamism and acknowledges its constant evolution and remaking.

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GENERATIVE SPATIAL MONTAGE WITH MULTI-LAYERED SCREENS IN *LOST FRAGMENTS OF NIGHT*

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ABSTRACT

Lost Fragments of Night is a poetic documentary film that utilizes an algorithmic generative editing system to preselect shots to be rendered over four screens arranged in layers. The artwork's subject is the chaotic and contradictory sensations found by night in the city of Seoul. In this work, the themes of disconnected and paradoxical images in urban public spaces resonate with the concepts of the multi-layered screens and generative editing system. The fragmented images are distributed over layers of screens to emphasize a chaotic and simultaneous sense of fragility that nevertheless together forms a whole. Designed for large-scale installation in urban public spaces, our artwork has been prototyped via a physical miniature, projecting by rear diffusion onto four layered screens constructed of grey sheer fabric. The audience can appreciate the montage from different angles and positions to produce different layering effects not possible in traditional 2D cinema. The generative editing system uses a dynamic Bayesian network constructed according to clips and timeline tagging. Audience members can actively contribute to the direction of the montage through a web interface, so the artwork creates different experiences by embracing the role of the audience in every screening.

surrounded by fragmented and simultaneous images of large information densities through digital media, over multiple screens, windows and mobile devices and increasingly required to connect these disjunct images in order to find meaningful relationships between them. The environments of creating and appreciating montage are expanding in spatial dimensions, most notably in urban space. [3]

Lost Fragments of Night is a poetic documentary generative film, in which shots are computationally selected according to author tags and rendered over four layered in physical space. The artwork's material is the fragmented and paradoxical images found by night in the city of Seoul and its themes of disconnection and heterogeneity in urban public spaces resonate with the concepts of the generative editing system and multi-layered screens: The fragmented images of diverse locations, people and objects in Seoul are distributed over layers of screens to emphasize the chaotic and simultaneous sense of fragility that still forms a whole when composed together. The generative editing system has an internal logic, but creates unfixed and constantly differing montage through its database, emphasizing the countless possibilities of coexistence and separation in a major urban complex.



Fig. 1. Photograph of the *Lost Fragments of Night* miniature. (Video of artwork can be viewed at <http://www.sojungb.com/work1/>).

INTRODUCTION

The contemporary city is a megalopolis full of asynchronous forces and paradoxical multiplicities of separation and coexistence. The process of integrating such disconnected and transitory stimuli in the city may also be likened to the construction of montage in cinema. According to Walter Benjamin, juxtaposing the fragments of city images is a process that by connecting distinct existences breaks down the isolation between them and thus can be considered as a montage technique. [1], [2] Nowadays, we are

Lost Fragments of Night grants roles to the audience as a part of the artwork. The audience can appreciate the montage in public space from different angles and positions to produce different layering effects not possible in traditional single-screen cinema. Furthermore, audience members can have a role beyond that of a viewer through actively contributing to the direction of the montage by using the interactive editing system. From these contextual variations, the artwork develops different experiences by incorporating the contribution of the audience in every screening.

RELATED WORK

Public Space and Cinema

Cinema has historically captured and revealed the spatial and social dynamism and complexity of urban spaces, however the relationship between cinema and urban public space goes beyond content. [4] Cinema and urban environments have structural and functional similarities. The modern metropolis mediates and creates relations among people, things, forces and activities – the city itself is a medium.

A city can, for example, be considered as an archive with continual accumulation as well as destruction and subtraction: temporary preservations of the past as constantly reconstituted memory. In other words, urban public space embodies historical memory and

continually generates temporal images and relations. [5] Cinema is also both medium and archive that records and sharing historical memory by containing past existence within moving images.

Walter Benjamin made a connection between the perception of a city and the appreciation of cinema. The modern city is an assemblage of absurdities and remains fragmented and unconnected. Montage is not only an essential technique of film editing for juxtaposing distinct shots but also a conceptual process for linking separated images. [1], [2], [6]

Spatial Montage and Multi-screen Display

Editing in film is the connection of different shots to create a whole and by sequencing events can effectively draw stories. [7] There are editing conventions that are primarily concerned with consistency and maintenance of natural visual sequence and narrative flow such as “continuity editing.” However, breaking the conventions of consistency can sometimes intensify emotional rhythm and convey richer nuances of situations; this is called “complexity editing.” [8] Editing is thus also considered the choreographic shaping of physical rhythm in film. [9] Montage literally means “setting together” or “assembling.” Sergei Eisenstein showed how the juxtaposition of two shots is qualitatively distinct from the experience of each shot viewed in isolation. He also portrayed montage in terms of counterpoint, coordinating multiple voices over time with parallel structure. [10]

The cinematic notion of montage is expanded though the multiplicity of information-based images of digital technology. For example, Lev Manovich suggests a concept of *spatial montage*, juxtaposing screens of different sizes and proportions that show separate images with simultaneous relationships, as an alternative to the single-screen montage. [3] Of course multiple screens may be employed to convey maximal information in minimal time, however returning to Sergei Eisenstein’s metaphor a multi-screen format suggests a music that is boundless, multi-directional yet still simultaneous. [11] There have been many efforts to use multiple screens in cinema, especially in the avant-garde and ‘expanded cinema’ movements such as the Labyrinth production at Expo’67. [12] Although these types of films did not develop into the mainstream, the characteristics of digital media with multiple windows and database logic present a widely accessible contemporary echo. The borders between avant-garde and mainstream in cinematic experimentation are starting to blur. [13]

Database Cinema and Generative Art

A database is a collection of data structured to make searching and retrieval more effective and efficient. A database can form the center of a creative process that makes unfixed and generative artworks with dynamic fluctuation. For example, Lev Manovich created a “database cinema” using the computer in the *Texas* soft cinema project. Database cinema can be understood as a generative cinema that creates cinematic experiences through the execution of computational algorithms. In *Texas* for example,

the database contains video clips each annotated by several parameters. The software uses these parameters to assemble clips together, building montage through parametric similarities. [14] Databases have been used for a variety of open-ended, unfixed and generative art forms, however, there remains great potential for deeper explorations in generative cinema. [15], [16]

Computer generative art is created by computer programs, typically with minimal intervention from humans and an emphasis on processes that can generate multiple outcomes. [17] By adopting autonomous processes and randomness as methods for making artworks, generative art has been said to challenge traditional concepts of authorship and intention. [18] However, the generative approach has been relatively less examined for cinematic applications; the use of computer generative systems for making art have been predominantly directed to computer graphics and music. Prior research in generative video editing has generally emphasized technical editing rather than montage construction and aesthetic effects. [19], [20]

LOST FRAGMENTS OF NIGHT

Overview of the Artwork

Lost Fragments of Night shows fragmented and paradoxical images found by night in Seoul, a capital city full of complex phenomena juxtaposing the contradictory values and dislocated images created through an extremely compressed and uneven modernization. [21] Often called ‘the city that never sleeps,’ Seoul epitomizes the paradoxical and chaotic coexistence of heterogeneous and fragmented images in contemporary life. [22] The simultaneous relationship between fragmented elements in the city is related to the media requirements of the multi-layered screens and generative editing system. The images, which are presented over four layered screens, emphasize the paradoxical relationship between different elements through collage aesthetic effects. The editing system generates montage while following its own structural logic, revealing the unfixed coexistence and separation in a metropolis caused by modernization.

The source material includes 142 original video clips, 117 of which were shot by the author in Seoul by night, while the remaining 25 are significant historical and political archive clips relating to Seoul. The author annotates these clips with keyword tags and then designs a timeline also in terms of these tags. Between each screening, the generative editing system selects appropriate shots for each of the four screens according to probabilities based on their relevance to the timeline flow, their association with previously displayed clips and any pre-defined system-wide structural constraints.

Lost Fragments of Night is intended to be installed in urban public spaces such as streets, parks or subway stations. The contexts of artwork can be various depending on the space and positioning of the audiences. Furthermore, audiences can change the timeline tags to construct different montages using a simple web interface.

Through these environments and conditions, audiences can be active participants in the artworks.

System Configuration

We made a virtual simulation model for the installation in public space (Figs 2 and 7) and built a physical miniature display system as a prototype model (Figs 1, 3 and 6). In the physical miniature, projectors mounted at the base project by rear diffusion onto four layered translucent screens made of grey sheer fabric.

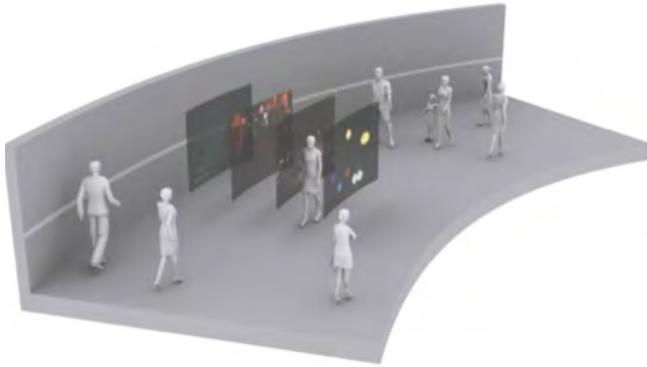


Fig. 2. Rendering of the proposed architecture of the final display.



Fig. 3. Photograph of the display miniature infrastructure used for evaluation purposes.

We designed a generative editing system that selects clips for each of the four multi-layered screens within timeline, runtime and effect guidelines set by a human editor. Montage construction guidelines are set by a system of manually tagging movie clips and points on the timeline. Selecting clips according to a dynamic Bayesian network then generates a playlist for each screen. The process is generative because each clip is selected with probability based on their utility for the specific requirements and the selection of each new clip is dependent on previously selected clips. The human editor guides the flow of the montage but the number of possible generated outcomes can be vast.

The system is implemented using two computer tools. One is the playback engine that runs on a local computer as part of the installation. The other is a portable interactive editing tool. A user

can access the interactive editing tool through a mobile device, creating tags for each clip and giving them weighting values between zero and one. Each tag is then added to a tag library for montage construction. There are also some predefined montage effects, such as forcing a clip to only play when the other screens are empty and to be played with an echoing effect across multiple screens. Once the author has described each clip with suitable tags they can create a visual timeline to represent the structure of the montage. The author can set a runtime and use any tag from the tag library to set target values at desired keyframe points on the timeline.

To work with interconnected tags, clips, screens and weighted probabilities changing over time, dynamic Bayesian networks were utilized. A time slice is created whenever a new clip is needed for one of the screens and each slice includes tag values for the clips and the target values at that time. Target values at each slice are calculated by linearly interpolating between the target values at the nearest keyframes that were created by the user. The playback engine uses Max/MSP/Jitter, a commercial audio-visual programming package, to render the clips for each projector. Tagging and timeline data is downloaded from the remote server hosting the web interface and used by the playback computer as inputs for the dynamic Bayesian network to create a playlist for the four screens. When a time signaled in the playlist is reached, the appropriate video clip is played and projected onto the multi-screen installation.



Fig. 4. The web interface of the editing system.

The multi-layered screens present various aesthetic effects. The overlapped screens readily lead to connections between images and their unification as collage. However, the screens are layered with depth, so viewers can also perceive each image independently, especially depending on the audiences' position and movement. Therefore, multi-layered screens show not only the individual images but also their combination at the same time. The author proposes that the poetic impact of the documentary film is intensified by layered display. [23] The poetic mode is a way of documentary filmmaking that breaks traditional narrative form and

expresses visual association, patterns and rhythm. These techniques are related to modernist avant-garde documentary making that favored radical juxtaposition of time and space; showing the traumatic reality of modernization by shattering and subverting the coherence of images. [24], [25]

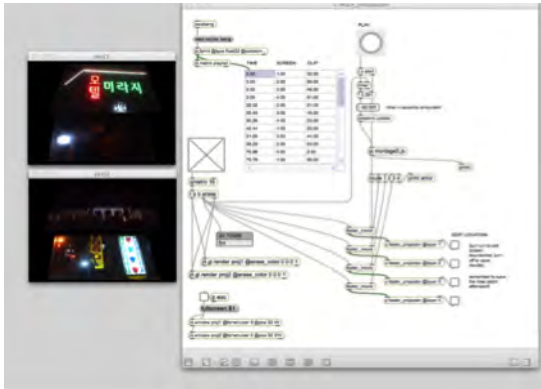


Fig. 5. The playback engine using Max/MSP/Jitter.

Aesthetic Effects

The author's use of multiple screens is also deeply influenced by the Maya Deren's concept of vertical montage. Maya Deren considered poetic effects in film through the metaphoric concept of the vertical, meaning the poetic expression that reveals central emotion and thought implicitly, in contrast to the horizontal, which is the construction of storyline. It is related to the vertical montage of Sergei Eisenstein, which emphasizes harmonization with various senses and images just as with counterpoint. [26], [27]



Fig. 6. Viewing the multi-layered screens from different angles (showing the same clip materials in left and right photographs).

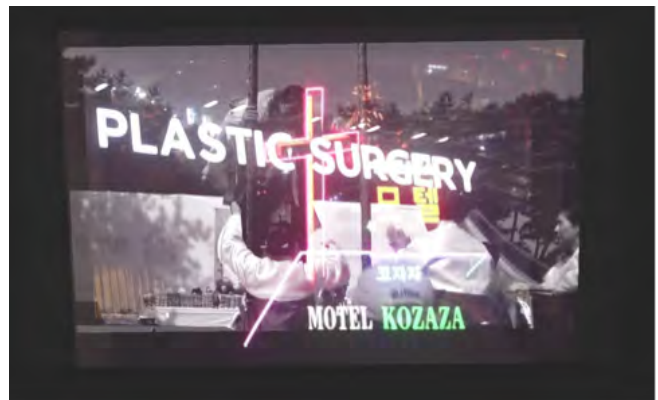
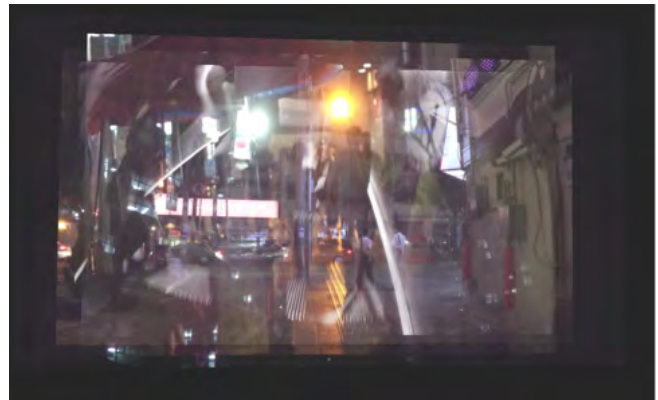


Fig. 7. Screenshots of the virtual simulation.

The generative editing system is operated by tags created by the author and utilizes a programmatic associative network that echoes association by metaphor in human memory. The program 'remembers' which shots were already shown before and which shots were shown together to build connections between clips that contribute to their probability of future selection. Human memory is similarly conformed by unfixed and metaphoric association in a network. In this system, tags provide condensed metaphoric meanings and the process of montage construction is networking metaphors is akin to the process of following mental associations. [28] The overall flow and authorial intentions are not lost because tagging and timeline construction provides an overall direction, yet unexpected effects may arise from the randomized selections. The occasional appearance of unexpected shots creates conflict montage, intensifying the chaotic or absurd sensations of paradoxical coexistence.

CONCLUSIONS AND DISCUSSION

We created a poetic documentary film and new media artwork *Lost Fragments of Night* about the disconnection and fragmented images of Seoul, utilizing a tag-based generative editing system and multi-layered screens. It challenges viewers to draw connections between the fragments in order to understand an overall theme: a montage with four surfaces of images containing a theme with a single vision. However, montages are stochastically generated in every screening. Although author can constrain the

montage construction with the tag-based editing system, it is impossible to control every assemblage. The video clips depict images of everyday scenes that we slide by without much attention. Drawing connections between different images is an act of bridging the gap of our isolated and fragmented nocturnal realities in cities such as Seoul. This artwork has not yet been displayed in public space. A miniaturized model has been produced for initial evaluation, however, people's reactions toward the full artwork have not been assessed. Our next steps will include a full size display of the artwork and its evaluation of the audience's response in a public urban space.

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MEDIA FAÇADES: AUGMENTING URBAN LOCATIONS THROUGH INTERACTION

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ABSTRACT

Media façades incorporate new technologies to augment urban space, inspiring people to renew their relationship with place, connection to location, cultural identity and sense of belonging. With emerging new technological applications, artists and designers are being called to transfigure public space, making it interactive by transforming the urban fabric into a dynamic tool. In this paper, we analyse how people reinvent their location by examining two contemporary international interactive media façades; the *Digital Wall* in Central Park in Sydney and *Islamic Design* on Metro stations in Dubai.

Central Park's *Digital Wall* is Australia's largest interactive wall in a public shopping center. Inspired by K11 Art Malls, a Chinese shopping mall franchise that features artworks by international artists such as Damien Hirst. We discuss artworks using mind computing technologies from the *Digital Wall's* 7mm curatorial pitch, to analyse how the public can alter their inner-city location through interaction. In this urban shopping space the artworks invite users to wear a biosensor headset which captures their individual brainwaves, subsequently transforming the imagery displayed and creating an interrelationship between the wearer, the environment and the artwork. The *Digital Wall* is a new way of thinking about urban space by integrating local artists to promote community engagement to inspire and enable community interaction within the urban location. The *Digital Wall* rethinks public space, taking into consideration the citizens as main actors, empowering them to become instruments of transformation of the location they inhabit.

Dubai is hosting the 2020 World Exposition under the theme; *Connecting Minds, Creating the Future*. In our proposal, interactive media façades will feature Islamic patterns on Dubai's metro stations. The artworks will provide the estimated 25 million visitors an opportunity to learn about Islamic heritage whilst being an integral part of the visual changes caused by spectator involvement. Moreover, the observed exploration of geometric patterns will reinstate the concept of 'dynamic and fluid' Islamic art, both calligraphic and geometric, as an integral part of Dubai's modern and traditional identities. The façades will contain integrated devices with monitors, in proximity to the metro stations, allowing people to interact with and transform the fluid Islamic patterns. The key characteristic of this design relies on smart technology to create a dynamic metro station shell using sensors to capture solar energy throughout the day.

Media façades as a medium for human interactivity within urban space has philosophical, spatial and social ramifications. As

philosopher Timothy Morton argues in *Realist Magic: Objects, Ontology, Causality*, our sense of proximity to the elements that make up a 'location' have now changed; we can no longer imagine ourselves as visitors to a location outside of ourselves or separate from the macro and microcosms of which we are part. Thus we endeavour to contribute to a global conversation with this paper; how media façades create public experiences through which a sense of intimacy with location can be explored, felt and understood. Identity is at the heart of these immersive experiences, bringing unique experiential experiences from East (Dubai) to West (Sydney).

نبذة عن المشروع

تتضمن الواجهات الديناميكية تكنولوجيات عصريّة لزيادة الحيز الحضري، إلهام الناس لتجديد علاقتها مع المكان، تقوية العلاقة مع الموقع وتعزيز الهوية الثقافية و الشعور بالانتماء. مع ظهور تطبيقات تكنولوجية ناشئة و جديدة يسعى الفنانون والمصممون لإحياء مظهر الفضاء العام، مما يجعلها متفاعلة مع المحيط عن طريق تحويل النسيج الحضري إلى أداة ديناميكية. من خلال هذا البحث، نقوم بتحليل كيفية إحياء الناس لمواقعهم الحضرية و مدتهم من خلال دراستين معاصرتين لواجهات وسائل الإعلام التفاعلية الدولية؛ و تتضمن الدراسة التحليلية للجدار الرقمي في «سنترال بارك» في مدينة سيدني، والتصميم الإسلامي الديناميكي و المعاصر في محطات المترو في دبي

واجهة سنترال بارك الرقمية هي أكبر جدار تفاعلي في مركز للتسوق العام في استراليا. الواجهة ١١ المتواجد تحديدا بمركز صيني للتسوق و الذي يضم أعمال فنية K مستوحاة من المشروع الفني لفنانين عالميين مثل داميان هيرست. نناقش هنا الأعمال الفنية باستخدام تقنيات الحوسبة العقلية والتي لعبت دورا هاما في تنظيم الجدار الرقمي ذو السمك الموافق لسبعة مليمترات، لتحليل كيف للجمهور أن يغير الموقع داخل المدينة من خلال ديناميكية التفاعل. في هذا الفضاء الحضري للتسوق تعتبر الأعمال الفنية دعوة مفتوحة للمستخدمين لارتداء سماعة جهاز الاستشعار البيولوجي الذي يلتقط الموجات الدماغية الفردية، ثم يحولها في وقت لاحق إلى صور معروضة تخلق الترابط بين الشخص المشارك والبيئة والعمل الفني. الجدار الرقمي هو وسيلة جديدة للتفكير في الحيز الحضري من خلال دمج الفنانين المحليين لتعزيز المشاركة المجتمعية واستخدام التقنيات التفاعلية لإلهام وتمكين المجتمع من التفاعل داخل الموقع الحضري. هو وسيلة لإعادة التفكير في الفضاء العام من خلال أخذ الفنانين المحليين بعين الاعتبار، وتمكينهم من المساهمة لكي يصبحوا عناصر مشاركة وفاعلة لتغيير المواقع الحضرية التي يعيشون فيها

ستستضيف مدينة دبي المعرض العالمي ٢٠٢٠ تحت شعار: ربط العقول، وخلق المستقبل. يقترح الفنان التشكيلي و المعماري مجدي الفالح واجهات تفاعلية تستخدم أنماط مختلفة من الزخارف الإسلامية في محطات مترو دبي. إن هذه الأعمال الفنية توفر فرصة لنحو ٢٥ مليون زائر للتعرف عن كثب على التراث الإسلامي في حين أنها جزء لا يتجزأ من التغييرات المرئية الناجمة عن مشاركة المتفرج في عملية تفعيل الزخارف الديناميكية. علاوة على ذلك يتيح هذا المشروع فرصة للمتفرج أو للدارس لاكتشاف مجموعة من الأنماط الهندسية التي تبث مفهوم «الديناميكية» في الفن الإسلامي، سواء كتابية كانت أو هندسية، كجزء لا يتجزأ من تدعيم هوية دبي الحديثة والتقليدية. سوف يحتوي المشروع على أجهزة تحكم متكاملة للزوار بالقرب من محطات المترو، مما يتيح للناس فرصة للتفاعل مع الهندسة وتحويل الزخارف الإسلامية إلى أشكال مختلفة و أكثر حيوية. الخصائص الرئيسية لهذا التصميم يعتمد أيضا على تقنية ذكية لخلق ديناميكية على واجهات الاسقف الخارجية لمحطات مترو دبي باستخدام أجهزة استشعار عبر التقاط الطاقة الشمسية على مدار اليوم

الواجهات الديناميكية تعدّ وسيلة للتفاعل البشري داخل الحيز الحضري ولها أبعادها الفلسفية، المكانية، وتأثيراتها الاجتماعية. يقول الفيلسوف تيموثي مورتون أن مشاعرنا تجاه العناصر التي تحدد

المحيط في تغير متواصل. لم يعد بوسعنا أن نتخيل أنفسنا كزوار في موقع خارج أنفسنا أو موقع منفصل عن العوالم المكبرة و العوالم المصغرة التي نحن جزء منها. وبالتالي فنحن نسعى من خلال هذا البحث إلى المساهمة في الحوار العالمي. هدفنا التعريف بالواجهات الديناميكية في المعمار المعاصر من خلال وصف التجارب الشعورية التي تخلقها هاته العناصر. الهوية هي جزء لا يتجزأ من هذه (التجارب حيث انها تجلب الخبرات التجريبية الفريدة من الشرق (دبي) إلى الغرب (سيدني).

INTRODUCTION:

Interactive environments are spaces where architecture and digital technologies collide. These spaces respond to visitors who interact with the technological devices contained therein, creating an immersive experience between the user and their environment. This participation creates a durable impression at the intersection of experience and expression.

In this paper, the authors discuss inventive new methods for augmenting urban space through the use of interactive technologies. We analyse two media façades, in Sydney and in Dubai and show how both examples inspire visitors to explore their locations through playful and imaginative means. Using these works as conduit, citizens become creative directors of their cities, altering, shaping, reforming and reimagining their urban space. The first façade we discuss is the *Mind Painting* project, which uses new technologies to directly translate the brainwaves of visitors into abstract digital paintings. The images are then displayed on Sydney's largest media façade, The *Digital Wall*. Levels of stress or relaxation outputted by visitors' brainwaves transform the images on the wall, creating an interactive environment where citizens can mould and reconstruct the space around them. The second façade we analyse is *IDENTITecture*, a curvilinear media façade that stretches across metro shells in Dubai, encouraging visitors to interact and engage with incandescent Islamic patterns and geometry. Media façades are the medium of connection between visitors and their location, allowing engaging interactive experiences, inspiring visitors to become artists using digital tools to transform their urban environment.

Media Façades

Historically, the term 'media façade' is associated with the cutting edge of digital advertising and the animated screens of commercial districts such as The Strip in Las Vegas, Times Square and London's West End. However, the last decade has seen a triumph of architects, designers and artists utilising the increasing availability of cutting edge technology, to create a new urban phenomenon: Media Architecture or Mediatecture. Within this genre of urban design, the interactive media façade functions as both a physical and a conceptual form. It acts as an interface between the physical and the virtual, representing both the integration of architecture with new technology and the blurring of boundaries between the digital and the corporeal. Media façades superimpose the virtual space of electronic media onto urban space. This facilitates a framework within which citizens become woven into the urban fabric of the city, acting as part of an infinite loop of data, becoming both a receiver and a transmitter

of information. Interactive media façades challenge the concept of what constitutes public space. [8]

The presence of the media façade changes the urban landscape so that citizens are inspired to reimagine their sense of belonging as they interact with their physical surroundings in new ways. [13] Media façades bring creativity into the public sphere and facilitate the communication of art to a cross section of society by directly involving the audience with interactive artworks. [6] Relationships to place become reinvigorated and renewed, the urban landscape becomes a playground for interactivity and those within it subsequently feel an increased ownership and responsibility towards their environment.

Interactive media façades exist at the intersection of architecture, art, design and human-computer interaction. It is within this sphere of trans disciplinary communication that notions of location and how we find beauty within it can be explored. The city might be evidenced on a map but what are the elements that make up our experience of place? How might our ideas about an urban location change were we to consider the parts of its sum as other types of whole? An urban location is composed of individual elements, such as bricks, glass and concrete, yet these do not compose the totality of its character. For instance, the concrete, asphalt and glass, of which the structure is invariably formed, contain sand, the composition of which reaches back millions of years and transcends many life forms; does this fact contribute to how we experience location?



Fig. 1. Central Park, 2014, Artist Interpretation, Central Park, Sydney, Australia, Digital Drawing © Frasers Property.

Research indicates that the design of urban space affects the psychological outlook of citizens. [2] Within the world of urban design and planning, there is an increasing importance, on the notion of an experience of 'beauty.' [7] While city planners argue the importance of aesthetic beauty, our expectations of what this means are evolving and we are currently seeing a shift in focus, towards the urban landscape being used as a tool for community experience, ecological sustainability and community interaction. Media façades facilitate blurring boundaries between physical and virtual space. Much as the geography of urban space provides

a foundation for the interweaving of connections between different disciplines and modes of inquiry, virtual space provides a perpetual canvas on which the human mind can project unbounded imagination. Within this rift, of consciousness, of perception of self amongst physical surroundings, the thoughts and dreams an individual experiences can be cultivated and subsequently projected. Philosopher Timothy Morton reminds us of the potential of this dialogue between the real and the corporeal when he writes: *"What is uncanny and slightly frightening at times about beauty is that it can't be located, yet it appears to emerge in interactions between things. Beauty then is a kind of lie that is told of an object when it interacts with another object: a beautiful lie."* [3] Thus, it can be suggested that interactive media facades create an infinitely faceted experience of location, an open space within the city, on which individual and collective ideas about beauty can be projected.

MEDIA FAÇADE, CENTRAL PARK, DIGITAL WALL

A global collaboration of architects and artists created Central Park, a new urban village, based on the concept of a 'Living Mall.' Sustainable features include a vertical garden (Fig.1) and the complex is situated among a plethora of art studio's and galleries. The galleries feature works by local and international artists, aiming to develop appreciation and audiences for artists in a public space. Visitor's witness art being made and can create their own transforming their urban location.

There is a 15 meter long façade in Central Park designed by internationally renowned light artist Bruce Ramus (Fig. 2) as a permanent installation, fusing art, technology and design. Showcasing curated creative content, it is curious, playful and rewards interaction with live sound and imagery.



Fig. 2. *Digital Wall* with Bruce Ramus and Caitilin de Bérigny, 2014, Central Park, Sydney, Australia, Digital Photography, Image © Nathaniel Fay.

Mind Painting Project

Mind Painting is an innovative, interactive project, which engages users to paint with their minds via live input from their brainwaves. New technologies are incorporated into the project, which enhances the urban space, by inviting people to transform, renew and alter their relationship with their location. Caitilin de Bérigny and Bruce Ramus collaborated with Designer Renee Lance and

technical innovation specialists James Cook and Jai Honeybrook-Carter from Sydney University, to facilitate the *Mind Painting* project, for the 7mm Pitch. The 7mm pitch is a curated program, referring to the distance between each pixel that forms the façades. In her studio and along with her students from the Interaction Design and Electronic Arts program (Fig.3), de Bérigny directed the creation of programming sketches, which allow users to input their brainwaves into individual NeuroSky MindWave headsets.

The NeuroSky MindWave measures and outputs the electroencephalogram (EEG). An EEG measures the electrical activity of the brain. Brain cells communicate with each other by producing tiny electrical signals, called impulses. An EEG measures this activity. The Mindwave measures alpha waves and beta waves, recording the attention and meditation levels of the user. The subsequent data, shaped by an individual's state of mind, is then translated into visual images and used to create abstract digital paintings which are displayed live on *The Digital Wall*.



Fig. 3. *Digital Wall*, Caitilin de Bérigny with students in the Interaction Design and Electronic Arts program, Sydney University, 2014, Central Park, Image © Jai Honeybrook-Carter.

As users states of mind transform the imagery for all to see, a genuine interaction and collaboration between the public and their location takes place. Moreover, the end result offers a unique opportunity to explore notions of what mind can mean, both in a visual and a philosophical sense.

Plants, creating a four-sided vertical garden, surround the outside of the architectural façades. Once inside, visitors are enclosed in large three-storey space, lit by a glass ceiling with running water. Swathes of plants line the surrounding architecture, climbing up the elevators, creating a lavish, green living landscape. It is within these lush surrounds and in view of the three storey high ceiling, rests the 15-metre long media façade. In front of the façade is an interactive kiosk, inviting users to sit and wear a headset entering into a relaxed meditative state. The *Mind Painting* project facilitates the transformation of the urban location, enabling users to become a part of the space. The space is transformed as users (re) present their unique mind states, creating digital paintings.

The *Mind Painting* project transgresses the boundaries between the physical and the virtual. Thought becomes visual, mood becomes art, inside becomes outside. The project rearranges public space by playfully engaging the visitors to become actors, empowering them to become instruments of transformation of the location they inhabit. As philosopher Theodore Adorno wrote so succinctly: “*Beauty is an event in being, a sort of gap, a gentle slit. Beauty allows for a cognitive state that is noncoercive and profoundly nonviolent.*” [1] We propose that it is within this blurring of virtual and physical space that individuals can experience a type of profound beauty.

DUBAI METRO STATIONS: IDENTITECTURE Interactive Technologies and Islamic Geometry

Interactive architecture explores the fusion of technologies and virtual spaces, with tangible spatial experiences. Instead of defining an architectural finished product, this site becomes fluid. This flexible nature is illustrated in *IDENTITecture*. The experimental media façades *IDENTITecture*, developed by artist and architect Majdi Faleh, from the University of Western Australia, embeds new interactive and green technologies within Dubai’s metro stations. *IDENTITecture* combines identity and architecture, challenging traditional, confined architecture as well as ‘modern’ and corporate. The video of the interaction can be found at: <http://vimeo.com/105527654>

The cladding for *IDENTITecture* designed in Dubai, has highly insulated properties that reduce energy consumption. [10] *IDENTITecture* uses micro-sensors embedded into the cladding. The sensors use solar power. The patterns use different calligraphic and floral styles, when temperatures rise; the patterns change, becoming fluid (Fig. 7). When temperatures cool down, the patterns and composition become less fluid (Fig. 5). When trains approach the sensors detect movement, sending signals to the patterns, which change opacity from transparent to dark and start to become more fluid as the train is moving either towards the station or away from it (Fig. 6). Thus, different interactions occur depending on temperature and movement.

In *IDENTITecture*, users can modify patterns through a screen and a control system installed near the station. Through a computer that is installed on site, the users manage to modify the patterns and learn about their historical value. In the meanwhile, the patterns continue to flow in different directions depending on the movement of the train and the weather conditions. This device creates a highly rewarding interactive experience that offers a new way of exploring the intricacy of Islamic art. While many might imagine Islamic art to be an exclusive language, the complex geometries of which these patterns are formed, transcend traditional formal notions as they metamorphose. All citizens and visitors of Dubai become directly part of the perpetual renewal of *IDENTITecture*’s façades. The evolving and unfolding of its Islamic art becomes a symbol for all people; of the spiritual transcendence incited by experiences of beauty.



Fig. 4. Dubai JLT Metro Station, 2014, Majdi Faleh, Digital Photography, © Majdi Faleh.



Fig. 5. Historic Islamic Pattern Applied on Dubai Metro Shells, 2014, Majdi Faleh, Digital Photography and Graphic Design, © Pattern: Hassan II Mosque, Morocco and Photo: Majdi Faleh.



Fig. 6. Islamic Interactive Patterns: The pattern's fluidity is influenced by the metro movement, 2014, Majdi Faleh, Digital Photography and Graphic Design, © Majdi Faleh.



Fig. 7. Islamic Interactive Patterns: Dubai Jumeirah Lakes Towers Metro Station, 2014, Majdi Faleh, Digital Photography and Graphic Design, © Majdi Faleh.

Reinvesting Identities: National, Islamic and Global - Case of Dubai

Throughout the world, cities are changing due to their diverse character and dynamics of their morphology and urban form. Diversity and urban expansion are buzzwords that planners, artists and architects emphasize in their debates. The expansion of urban spaces requires wide-ranging experiences for the inhabitants. Cities are not only places to occupy, use or sojourn, but are new platforms of interaction, information and creative thinking.

Writer Dominique Kalifa states in his thought provoking book *Crime and Culture in the XIX Century* that mass culture is a culture of the image. [4] The age of information and technology and the age of accelerated globalization require experiences that engage users. Postmodern societies are pushing immersive experiences through a new culture of 'screens,' whether mobile, television, computer or computer game' interfaces. These technologies are comprised of 'Meta Design': coding languages; communication pattern; cognitive sciences; spatial concepts and architecture. [11] Architecture must use new communication tools, creativity and technologies. Globalization brings programming, new technologies, performance and interaction into play. Multimedia technology specialist and curator Marco Mancuso states that: "*The changes I mean are those little multimedia sparks which have started to become part of the urban landscape surrounding us: digital screens set in frequently visited places (such as stations, squares and airports), interactive shopping windows, public projections and multimedia advertising billboards. Those elements are more and more discussed and arouse curiosity as much as the latest discoveries in the ever-present demotic.*" [12]

The progress of modern societies has created a new environment charged with objects, signs and interactions based on commercial or material exchanges. Neuro-marketing is invading our personal and public space. This concept is the use of neuro imagery techniques to identify cerebral mechanisms involved in the consumer's habits. The idea of stimulating the brain can be used to inspire people's connection with identity in urban spaces. Companies around the world have used this technique to study consumer product responses. [9]

The 'new' technological civilizations tend to overshadow the spiritual. Spirituality is part of the identity, identity transforms and builds history and thus history is needed for building an intrinsically sustainable and well-founded base for a future. Spirituality is needed in this context to revive geometric and intricate patterns of the past and to enhance the meaning of Islamic design identity. Interactive technologies, in general, have impacted our social spheres and changed them into more individual and distant environments. Through public art and installations, interactive spaces can potentially offer a different experience, where an interaction takes place between the viewer and what is viewed. The object can respond to the presence of a body or to an

electronic device. At every level, it encourages us to leave our small spheres and interact with the social group. Interaction also provides tenable and remarkable solutions for the workplace and the urban space. [5] The spiritual connection with the other enhances the interactive experience through technologies and establishes an equal environment for all users.

CONCLUSION AND FUTURE WORK

A crucial aspect of interactive architecture is the use of urban interactive media facades. The surface of buildings become a site to communicate audiovisual content, adding character to the building and urban location. Interactive surfaces are an indication of the transformation of the meaning and identity of place in the digital age. The evolution of interactive media façade technologies transcends limits of design, gathering architecture, design and interaction together. Multiple flows of technologies facilitate new ways of interacting with urban locations. To meet global markets identities in architecture and design are constantly shifting. The emergence of new systems of media facades, codification and motion sensors promotes new identities connecting the public to location, place and sense of belonging like never before.

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MOBILE SOUND AND (RE)MAKING PLACE

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ABSTRACT

Since the invention of the transistor radio, people have used mobile technologies to create privacy within the public spaces of urban environments. Devices such as iPods and mobile phones enable us to control social interactions in shared spaces -- ear buds signal to others that we are listening to music, even when nothing is playing and moments of social awkwardness can be alleviated by text messages, games and social networks. While it is easy to blame our devices for disconnecting us from the sights and sounds of everyday life, the connections and interactions made possible through pervasive computing enable us to transform our experience of urban life by creating new modes of engagement in, with and through the places where we live, work and play.

As we increasingly use our mobile devices to filter, augment and curate everyday interactions, our understanding of 'place' has moved from geographic specificity to spatial indeterminacy. Through a discussion of my own practice and other related artworks, I will examine how mobile sound artworks that rely on the body for context can shift the parameters of spatial practice from the body's position within physical space to the liminal space articulated by the moving body; how broadcasting sound through the body can facilitate new modes of sociality in public spaces; and how these temporary conditions and connections may be explored through networked performance.

INTRODUCTION

In the modern city, mobile technologies work as social filters. In any lobby or coffee shop, we see people communicating next to one another, but not to each other. In many situations, our devices are used to avoid interacting with others -- by appearing busy or unavailable, we are not obligated to interact with strangers. Since we can now connect to others from wherever we find a network, our sense of place, home and territory has become less dependent on physical location and more dependent on our connections and affinities. Home is no longer where we are from or where we live, it is wherever we are now.

My practice investigates spatial and social conditions within urban environments through interactive artworks situated at the intersection of sound, performance and mobile technologies. My approach to both sound and media is greatly informed by my experience of walking in urban environments, which I consider to be a form of personal and spatial encoding. I began working with sound and technology simultaneously out of a desire to articulate the immediacy of walking while carving out a sense of place within the acoustic ecology of the city. Over the past decade, I have navigated these spaces through a gradual progression from headphone-based artworks to interactive pieces that integrate, through embodied interaction, the affordances of objects with the expressive potential of the body.

Through a discussion of my own practice and other related artworks, I will examine how mobile sound artworks that rely on the body for context can shift the parameters of spatial practice from the body's position within physical space to the liminal, temporary spaces articulated by the moving body; how broadcasting sound through the body can facilitate new modes of sociality in public spaces; and how these temporary conditions and connections may be explored through networked performance.

HISTORICAL PRECEDENTS

Sony introduced the Sony Walkman TPS-L2 in 1979. While versions of portable tape players had been available since the 1960s (and normally used for dictation) the concept did not gain traction until record labels began to widely distribute music on tape, along with vinyl. Modeled on the bulkier Sony Pressman, the Walkman was first introduced in Japan and sold over 50,000 units in the first two months. The device was conceived of by founder Masaru Ibuka as a way of listening to music while on long flights.

In *Sounding Out the City: Personal Stereos and the Management of Everyday Life*, Michael Bull examined how people use personal stereos, such as Walkmans and later iPods, as a means of transforming, aestheticizing and personalizing their experience of every day life. [1] Over a series of interviews, users described the experience of stereo use as cinematic, where ordinary encounters gain significance when accompanied by the right music and where alternative narratives can be constructed based on what is going on around them. While everyday experience cannot be controlled, it can be curated and users often described listening to music as a way of bringing a piece of 'home' with them out into the world. By navigating everyday experience through a personal selection of soundtracks, the body articulates its presence in space through its engagement in a sonic journey through space. It is not insignificant that most people listen to music as they move from one place to another and the sounds selected become intertwined with a shifting frame of visual reference.

Devices such as Walkmans, iPods and mobile phones also enable us to control and filter social interactions in shared spaces. In *The Sonic Composition of the City*, Jean-Paul Thibaud (tee-bauwed) describes the walkman as "part of an urban tactic that consists of decomposing the territorial structure of the city and recomposing it through spatio-phonetic behaviours [...] the walking listener not only uses it to protect himself from the sonic aggressions of the city, but to also filter and enhance the events that give the place its meaning." [2] Headphones themselves function as visual signifiers of what he calls an "interphonic knot" the point of convergence between interior and exterior sonic spaces. In Bull's interviews, many users described how they used their headphones to control social situations -- for example, several female subjects

reported using their stereos in the London underground in order to prevent unwanted attention from other riders and how they would leave their headphones on even when nothing was playing.

It is not surprising, then, that artists have used mobile devices to explore the relationship between the body and urban space. In 1981, Dutch Fluxus artist Willem de Ridder created *The Walk*, a site-specific sound piece for the city of Amsterdam. Comprised of three cassette tapes, the piece was designed to “lead the listener to wander the entire country following the artist’s instructions recorded on a soundtrack that overlaid music, voice and story telling.” [3] Justin Bennett’s *Secret City* was an audio guide to the alleys and passageways of Middleburg, in the Netherlands. [4] Using a radio receiver and headphones, users were able to tune in to a series of 24-hour broadcasts that merged field recordings, interviews, texts and music.

Janet Cardiff’s *Forest Walk* took place along the paths surrounding the Banff Centre for the Arts, leading participants through the sound of footsteps, instructions, observations and dialogue. [5] The piece, which, according to the artist, “didn’t have very good instructions and the quality of my mixing was terrible since it was mixed on a 4-track cassette deck,” set the foundation for future sound walks in sites such as Gairloch Gardens in Oakville, New York’s Central Park and the Central Terminal in Kassel, Germany.

David Rokeby’s *Very Nervous System* (1982-91) is an interactive sound installation that uses video cameras, image processing software and sound generating systems to transcode gestural interaction into experimental music. In 1992, he performed the piece outdoors, as part of the Potsdam 1000 exhibition in Potsdam, Germany. While the performance did not involve the use of mobile devices, it is nonetheless significant in that it activated public space by merging the objective, logical and empirical processes of computation with the spontaneous, expressive and intimate qualities of the human body.

Christina Kubisch’s *Electrical Walks* are a series of augmented soundwalks that take place in various locations around the world. Audience members are invited to borrow a set of headphones, which generate sound in response to electromagnetic fields, WiFi networks, cell phone towers and underground power cables. [6] According to the artist, “the basic idea of these sound spaces is to provide the viewer/listener access to his own individual spaces of time and motion. The musical sequences are experiential in ever-new variations through the listener’s motion. The visitor becomes a “mixer” who can put his piece together individually and determine the time frame for himself.” [6]

Teri Rueb’s *Drift* (2004) is a locative sound walk that takes place along the tidal flats of the Wadden Sea in Cuxhaven, Germany. This pioneering artwork piece used GPS and custom software

housed in a PDA to situate mediations on wandering, walking and being lost to specific geographic coordinates. Users drift along the flats guided by the sound of footsteps. When the tide comes in, the piece shifts into the town.

THE BODY AS SITE

Mobile technologies affect our understanding of place by positioning the body of the user as the primary site of reception. The positioning of ‘body as site,’ enables mobile and wearable sound pieces to shift the parameters of site-specificity beyond the realm of locative practice. Over the past three decades, site-specific practice has expanded from conceptual artworks that rely on a specific location for context to artworks that conceive of ‘site’ through a set of parameters that sit beyond physical location. In *One Place after Another: Site-Specific Art and Locational Identity*, Miwon Kwon argues that as increasing numbers of artworks address ‘site’ through economic, political or social conditions, our understanding of place has shifted from geographic specificity to spatial indeterminacy:

Dispersed across much broader cultural, social and discursive fields and organized intertextually through the nomadic movement of the artist – operating more like an itinerary than a map – the site can now be as various as a billboard, an artistic genre, a disenfranchised community and institutional framework, a magazine page, a social cause or a political debate. It can be literal, like a street corner or virtual, like a theoretical concept. [7] By broadening our understanding of site from a specific physical location to a set of shifting parameters, ‘location’ can instead exist as a set of temporary confluences that can engage audiences through a cognitive, as well as physical encounter with an artwork. By encountering ‘site’ through the body, gestures such as explorative walking become a form of cognitive mapping where the residual effects of the encounter represent a form of notation.

THE BODY AS CONTEXT

In *The Functional Site or The Transformation of Site-Specificity*, James Meyer defines this space as a “functional site” which sits opposite the geographically-specific “literal site.” According to Meyer, the functional site: may or may not incorporate a physical place. [...] Instead, it is a process, an operation occurring between sites, a mapping of institutional and textual filiations and the bodies that move between them [...] the functional work refuses the intransigence of literal site specificity. It is a temporary thing, a movement, a chain of meanings and imbricated histories: a place marked and swiftly abandoned. [8]

Because functional sites do not ‘privilege’ place, location need not function as a precondition and the moving body takes on new significance and authority. Movement through space engages the user in a series of shifting spatial parameters and through cognitive, as well as physical processes. In *Getting Back into Place: Toward a Renewed Understanding of the Place-World*, Edward Casey argues that “if place is where we inscribe personal meaning, [...]”

then we are still 'in place' when we walk down the street listening to head phones or talking on a mobile phone. It becomes, however a different place with different inscribed meanings." [9]

Soundwalking draws from this authority through the practice of listening equally to all sounds within the acoustic environment. Hildegard Westerkamp describes soundwalking as "*any excursion whose main purpose is listening to the environment [...] exposing our ears to every sound around us no matter where we are.*" [10] While sound walks can take place in literal geographic sites, works such as Andrea Polli's *Antarctic Soundwalk* still rely on the temporary act of listening to contextualize the piece – the space becomes activated by the presence of the listening body. While all sounds originate from something, somewhere, the act of listening, without recording, positions the body as a temporary interface, where signals recombine and where site, sound and motion coalesce.

Sonic City by Lalya Gaye, Ramia Mazé, Daniel Skoglund and Margot Jacobs is a mobile artwork that re-imagines the urban environment as an interface for musical expression. The piece consists of sensors and a software interface that enables a user to "*create a real-time personal soundscape of electronic music by walking through and interacting with urban environments.*" [11] Sound is generated through a process of mapping 'discrete input factors' (incidental events, such as a car passing or a sudden change in route) and 'continuous input factors' (ambient events, such as heart rate and light level) to patterns of MIDI notes. The artists consider mobility as a form of interaction that combines gestural interaction and contextual awareness, creating a sonic dialogue between the user and the various stimuli within the environment. *Walking machine* (2003) is a wearable sound piece of mine that enables users to move through the city hearing the amplified sound of their own footsteps in real time. The piece evolved out of a desire to articulate the immediacy of walking, while carving out a sense of place within the acoustic ecology of the city. Users often explore the city as if in a playground, stomping on sewer grates, gliding through grass, splashing in puddles and jumping on garbage cans, while wearing the piece. The effect is that of a private game in a public space, where the simple act of walking becomes a form of embodied listening, gestural interaction becomes a means of articulating presence and play becomes both legitimized and liberated through technology.

Unlike early locative sound pieces such as those by de Ridder and Bennett or more recent examples such as Janet Cardiff's *Her Long Black Hair* or Teri Rueb's *Core Sample*, works such as *Sonic City* and *walking machine* can be performed almost anywhere. While geography is implied by the body's position at any given moment, that position is always changing. The only constant is the body. In the same way that mobile devices expand our understanding of site to include the body, we can also expand our understanding of the body to include those devices. The following section will examine how sound generated through the

moving body heightens our experience of the acoustic ecology of cities by extending the edges of the body, not only into the site, but also into the space of others.

NOISEMAKERS

In *Noise*, Jacques Attali historicizes economic development through sound, arguing that noise serves as a precursor to social and economic change. [13] Conditions within cities are often revealed through sound, indicating territory, demographics or functionality and politicizing urban space through its ability to invade the acoustic space of others and to affect behavior. As we continue to experience space through the private modes of listening, we become increasingly uncomfortable with the everyday noise and noisemaking of cities. While mobile devices enable us to connect to others, by silencing the social, we lose out on some of the eclectic experience of urban life.

One of the most significant encounters that informed how I think about broadcast occurred on the Queen streetcar in downtown Toronto in the summer of 2004. It was rush hour. I was on my way to work and sitting towards the back of the streetcar. A few minutes later, a boy of about fifteen sat across the aisle from me and began to blast hip hop from his headphones as loud as he could. As we approached the downtown core, it became more crowded. Instead of moving to the back of the streetcar, however, most passengers who were standing stayed towards the front. The soundtrack was distorted but not ear shattering, there were plenty of seats around us, the youth looked more or less like a middle class kid from the suburbs, but nonetheless, full grown adults preferred to crowd together than to sit down near us. This seemed to please the teenager immensely and he started to move around to the music and freestyle along to different passages under his breath.

Broadcasting sound through the moving body, whether through the act of walking or through gestural interaction with and through artifacts, can transform public spaces into social spaces through nonverbal modes of communication. Other artworks of mine, such as *Freestyle SoundKit*, *SOUNDBIKE* and *Swinging Suitcase* have formal and conceptual affinities with both private modes of listening, where mobile devices such as iPods infuse the space outside the body with personal significance and broadcast sound, which can instantly activate and politicize the social spaces of urban environments. *Freestyle SoundKits* (2006) are wearable sound pieces that generate and broadcast electronic dance beats as users move through urban environments, creating percussive soundscapes activated through collaboration, improvisation and one-upmanship. Drawing from the language of boom boxes and low riders, the piece articulates the presence of the user giving voice to the body and blurring the lines between body, artwork and site.

In *SOUNDBIKE* (2005) and *Swinging Suitcase* (2010), anthropomorphized sound and gestural interaction combine to reflect and then confound the relationship between user and

artwork. *SOUNDBIKE* is a mobile piece that generates and broadcasts laughter as it is pedaled through urban environments. The laughter starts when the bike reaches a cruising speed and then responds to velocity, enabling the rider to compose sound with his or her body. The speaker, which works as signifier, is housed on the back of the bike within a bright yellow case, separating the user from other riders and immediately drawing attention. When the piece is engaged, the rider creates a roving broadcast and human counterpoint to the urban soundscape.

Swinging Suitcase generates and broadcasts the sound of a flock of small birds in response to movement. Vocalizations are constructed from source clips of house sparrows, which are arranged into responses that range from single chirps to social chatter to scolding. When the piece is swung, the “birds” begin to make noise, which calibrate to reflect the rate of swinging – accelerating and multiplying in response to the gesture of the user and then confounding the interaction when they become “bored.” As the user continually relearns the piece, the gestural interaction becomes more complex, shifting exploratory gesture into the realm of performance and using the cognitive process of the user as a compositional tool. As you ‘play’ the birds, the birds ‘play’ you.

NETWORKED PERFORMANCE

In *Mobile Interfaces in Public Spaces: Locational Privacy, Control and Urban Sociability*, Adriana de Souza e Silva and Jordan Frith examine “how mobile technologies can be viewed as interfaces to public spaces, that is systems that enable people to filter, control and manage their relationships with the spaces and people around them.” [14] Through a genealogy of mobile media starting with the pocket book, they argue that, rather than disconnecting us from physical spaces, mobile technologies work as social interfaces to public spaces, enabling us to frame our experience through content of our own choosing:

While some critics argue that mobile technologies lead to a disconnection from physical space, there is an equally strong counter argument by which we consider mobile technologies as an intrinsic part of people’s experience of space [...] (Ibid, p. 45) By generating media and sharing it with others, we situate ourselves within the spaces we occupy, transforming public to private through social interaction. In *Re-Place-ing Space: The Roles of Place and Space in Collaborative Systems*, Steve Harrison and Paul Dourish define place as a space infused with meaning: Physically, a place is a space, which is invested with understandings of behavioral appropriateness, cultural expectations and so forth. We are located in “space,” but we act in “place.” Furthermore, “places” are spaces that are valued. The distinction is rather like that between a “house” and a “home;” a house might keep out the wind and the rain, but a home is where we live. [15]

My recent projects investigate, through networked performance, the ways that mobile technologies both situate and displace the

body, complicating our relationship to place, territory and community in both physical and virtual spaces. *Networked Derive* (2010) is a collaborative performance that takes place simultaneously between two geographically separate locations. Using mobile phones, twitter streams and a simple mapping system, performers in both locations engage in a series of occupations that coincide with the movements through the other city. The piece draws from the strategy described by Guy Debord in his *Introduction to a Critique of Urban Geography* from 1955, where he describes a friend using a map of London to navigate the mountainous Harz region of Germany. [16] *Networked Derive* follows a similar strategy, using paper maps containing one city per side and positioning them slightly askew. As each city reports its location to the other, the city receiving the coordinates locates the spot on the map and using a pushpin, makes a hole to the other side, turns the map over and goes to that location. The new location is then reported to the first city and the process continues. As users move from one location to another, each in their corresponding city, they form identical paths.

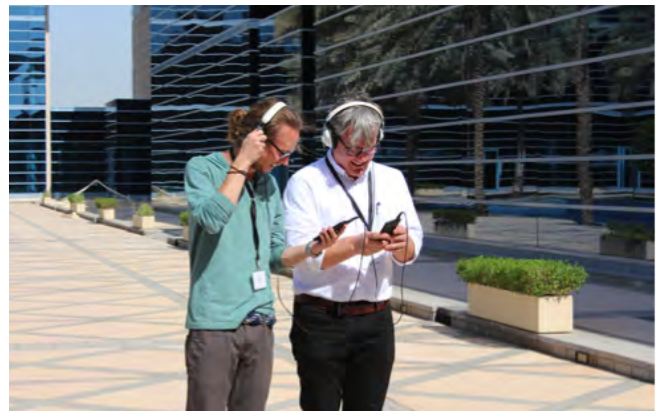


Fig. 1. *Triangulation Device*, 2004, Jessica Thompson, Android application. ©Jessica Thompson.

Triangulation Device is a participatory sound piece that generates improvised soundscapes using the movement of the body as a compositional device. The piece is performed simultaneously between two participants. Each participant is paired with a device, which transcodes its location to the other in real-time, generating sound through the body and creating atmospheric soundscapes that unfold and change in response to their movement and proximity.

The project builds on two pioneering artworks by Canadian media artists: Vera Frenkel’s *String Games: Improvisations for Inter-City Video* (1974) explored real-time video transmission at Bell Canada Teleconferencing Studios in Toronto and Montreal by inviting groups of artists to engage in an open-ended improvised performance by creating a cat’s cradle between the two cities. Norm White and Doug Back’s *Telephonic Arm Wrestling* (1986) was a real-time arm wrestling match between participants in Toronto and Paris.

The work has parallels with other projects such as *David McCallum's Warbike* (2007), a bicycle that generates electronic music as moves through open and closed WiFi networks, Brian House's *Quotidian Record* (2013), an album and artifact created by recording the artist's movements for a year and translating the data into sound and Mirae Rosner and Jesse Scott's *SoniCity* (2013), an Android application that transcodes pathways and velocities into sonic reverberations.

The movement through space, especially the exploratory, uneven patterns of wandering, engages the body through a series of shifting spatial and social parameters. Unencumbered by the confines of location, participants using the Triangulation Device are able to drift through cities in an almost tactile fashion, articulating social interactions through proxemic interaction, performative improvisation and play. By broadcasting sound into space through collaborative noisemaking, the project facilitates new and novel forms of sonic interaction that investigate how mobile technologies affect our understanding of our place in the world and our relationships towards one another.

In the same way that performing through objects merges the affordances of those objects through the expressive potential of the body, as seen in works such as *Swinging Suitcase*, the *Triangulation Device* extends the edges of the body to the other user. By generating sound through the moving body, users are able to articulate social interactions through direction, speed and proximity, creating new modes of connection through improvisation and collaboration. By broadcasting sound through gestural interaction, the *Triangulation Device* disrupts social conventions by facilitating connection, interaction and collaboration with others, reconnecting people through spontaneity, chance and serendipity and reclaiming urban space as a place for meaningful interaction with others.

CONCLUSION

Mobile technologies enable us to filter, augment and construct our experience of the world around us, transforming 'space' into 'place' by replacing the acts of listening and speaking with sharing content and connecting with friends, family and contacts. As social networks facilitate more of our connections to the world, an increasing number of our everyday interactions are with 'people like us' [...] those who we share common interests, backgrounds and affiliations. So, while mobile technologies enable us to experience a sense of connection within urban environments, increasingly, those connections leave out the variety of events, experiences and communities that drew many of us to cities to begin with. Sound, then, through its physicality, itinerancy and invasiveness, enables us to re-make place by un-silencing the social and returning us, in meaningful and tangible ways, to the many places we call home.

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IN DUBAI, IMAGINING FUTURE CITIES

Nina Colosi, Streaming Museum, New York, USA

ABSTRACT

Streaming Museum was a creative partner in the 20th International Symposium on Electronic Arts which took place at Zayed University and at cultural and educational centers across Dubai, Abu Dhabi and Sharjah in the United Arab Emirates (UAE) during November, 2014. The dramatic futuristic cityscape that is evolving as part of the UAE's master plan to become a world center of knowledge and innovation, was the right setting in which to reflect on the conference question of how Streaming Museum contributes to future cities.

BIG PICTURE

Imagining future cities can begin from the vantage point of looking at the Big Picture: people see things through the eyes of their own beliefs and cultures. But the world that we all have to deal with is an interdependent one.



Fig. 1. Image courtesy of NASA.

Astronauts get the true sense of this when they have the awesome experience of seeing the Earth in space – it's called the "Overview Effect." It transforms their perspective of the planet. They see it as our shared home without boundaries between nations, humans and nature.

There are no national borders when it comes to global warming and economic crises, health pandemics, terrorism, poverty, weapons of mass destruction, trafficking, crime and many other problems of the 21st century. It is futile to try to address these challenges with 18th century solutions conceived around the notion of national sovereignty which stop at territorial national borders.

But imagine... a league of "global digital cities" sharing a new system of governance through Internet communication. They

could share best practices, join forces to solve problems and enable the monitoring and distribution of renewable energies, health services, and social needs.

And imagine... exchanges of art, culture, visionary ideas and data visualization to enhance this global governance through digital networks.



Fig. 2. Afghanistan, Photo by Teru Kuwayama, 2011.

This would build upon and expand existing international cultural exchange programs – such as the Fulbright Scholarship program that assists in the development of peaceful relations. But in addition to these on-location programs, this future scenario offers audiences worldwide the opportunity to participate in cultural exchange through mobile devices and in public spaces across many cities.

The digital circulation of art via the Internet and a network of large screens and media facades in public spaces across continents is already up and running with Streaming Museum and the Connecting Cities network. It is a precursor to globally connected city government systems proposed by political scientist Benjamin Barber and others.

The Streaming Museum was launched in 2008 as a symbolic experiment to interconnect the world through the arts. It produces original themed exhibitions of contemporary art and accompanying public programs that have reached millions of people, from North Pole to South Pole, from the largest metropolises to remote locations. The exhibitions are presented at StreamingMuseum.org, and in public spaces and partnering cultural centers on seven continents.

Our partner, Connecting Cities, is building up a connected infrastructure of media facades, urban screens and projection sites to circulate artistic and social content. Initiated by Public

Art Lab and funded by the European Union, it launched in Berlin in 2012 and is expanding worldwide.

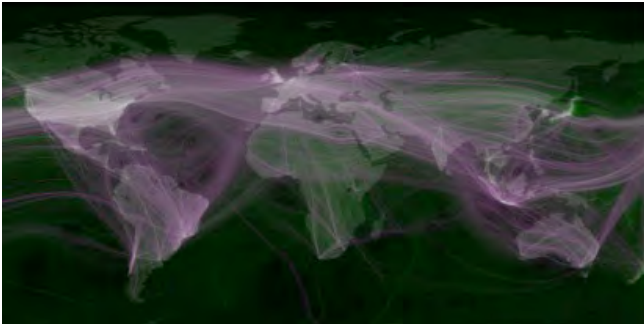


Fig. 3. World Travel and Communications Recorded on Twitter, by Eric Fischer, 2011, © Eric Fischer.

Establishing a body of governance for globally connected cities is a monumental challenge. However, the notion has broad appeal as the best solution for tackling the world's worst problems. Fortunately, several organizations and individuals are enthusiastically working to make it happen. Two of the most promising outcomes are The Mayor's Challenge Initiative which was recently launched by former New York City Mayor Michael Bloomberg, and the Global Parliament of Mayors founded by political scientist Benjamin Barber.

In his book *If Mayors Ruled the World: Dysfunctional Nations, Rising Cities* Barber asserts that mayors are hands-on problem solvers unburdened by issues pertaining to borders and sovereignty which paralyze the capacity of nation-states to work together. Barber intends for the Global Parliament of Mayors to usher in a movement of networked "glocalism" to tackle shared problems. It would become the keystone over existing mayoral organizations such as the 100-year old United Cities and Local Governance, the US and Mexican Conferences of Mayors and many other associations across the globe who are already sharing best practices.

One of the ways mayors can work together is by leveraging the global market place by incentivizing the use of manufactured products that can bring about fundamental changes. For example, in Jersey City the mayor has a plan to use the market to change gun laws: If city police departments across the country were required to buy their guns from companies that don't sell magazine assault rifles and armor piercing bullets, the market would drive more gun companies to shift away from selling the most egregious types of guns to citizens. A coordinated mayoral policy such as this could be a more effective way to reduce gun violence than lobbying for anti-gun laws.

The A.T. Kearney is a global research company that publishes an annual Global Cities Index of the top 84 cities. Their research makes clear that working together on a long-term vision is

completely within the grasp of urban leaders and business leaders around the world. The shift to a more global perspective of problem solving will result in greater human and economic development and create an environment that offers a better future for all of society.

THE UNITED ARAB EMIRATES FROM REGIONAL AND GLOBAL PERSPECTIVES

Established in 1971 by Sheikh Zayed bin Sultan Al Nahyan, the United Arab Emirates, a federation of seven emirates, has been moving rapidly through the stages of nation building. Following the priorities established by Sheikh Zayed, the UAE is nurturing generations of educated men and women, and developing international ties establishing the UAE as a country with global reach and significance. A.T. Kearney's 2014 Foreign Direct Investment Confidence Index, an in-depth view of forward-looking investment sentiment, ranked the UAE in 11th position increasing its global lead by moving up from 14th position in 2013. The U.S. maintains its 1st place position from last year followed by China and Canada.

Dubai, the commercial capital of the Persian Gulf region and the most populous Emirate, won the bid to host the World Expo in 2020 because of its infrastructure and level of national support. This mega event platform presents the UAE a golden opportunity to engage the global community in common priorities of enhancing mobility of people and goods, ensuring sustainable use of resources and creating economic development by expanding networks of information and financial capital.



Fig. 4. Dubai, photo by Nina Colosi, 2014, © Nina Colosi.

Visionary leadership is ushering the UAE into the future. Badr Jafar, CEO of Crescent Enterprises founded the Pearl Initiative in 2011, in collaboration with the UN Office of Partnerships, to promote factors that will incentivize growth in both international and regional business in the Middle East. The initiative advocates for government regulation to provide the framework for public and private sectors to work within, and corporate leadership to create a prevailing culture of internal checks and balances. Through this initiative Jafar asserts that ethics can be turned into a competitive advantage.

In Sharjah, known as a capital of education and culture in the UAE, a collaboration between the Pearl Initiative and the School of

Business and Management at the American University of Sharjah is engendering a culture of transparency and accountability in the leaders of tomorrow. These talented business leaders working with the creative economy that the region has to offer can act as ambassadors to develop communication with other parts of the world.



Fig. 5. American University of Sharjah.



Fig. 6. Sunchaser solar car created at The American University of Sharjah in collaboration with Siemens.

Jafar's vision extends into social entrepreneurship, empowerment of women, youth employment and the arts which he says "have the power to change hearts and minds." In 2011 he founded the Middle East Theater Academy in collaboration with the Kevin Spacey Foundation, to introduce, influence and nurture the youth of the region in the art of theatre, stage performance and related education. He co-produced the music video *Tomorrow* with the legendary music producer Quincy Jones featuring leading popular Middle Eastern and North African singers, to inspire a new generation of young people to think about peace and a better tomorrow, and to bridge divisions across the Middle East. Developments in the arts sector, including the development of international ties through the arts, are an important part of the UAE's forward thinking planning for the region. The arts are considered an important way to communicate an understanding of the region, its history, values, philosophy as well as its future vision and global outlook.

Three museums are under construction that are being financed by the government of Abu Dhabi. Situated in the capital of the United Arab Emirates these include branches of the Guggenheim Museum, with a building designed by Frank Gehry, the Louvre with a building designed by Jean Nouvel as well as the Zayed National Museum designed by Norman Foster.



Fig. 7. Zayed National Museum, Abu Dhabi, designed by Norman Foster, computer rendering, © Norman Foster Associates.

Architect Frank Gehry told the New York Times that the intentions of the Emirates in building the Guggenheim is to show the world that multiple cultures "can be together in one room and talk to each other. I think it's some kind of a revolution and I think given the political mess of all these countries including ours, there's a clarity in talking to each other through art, through classical music, through literature, rather than trying to politicize one-upmanship and all the military options that are threatening everybody. It seems that the art takes the threat out and it becomes more humanistic – it's more questioning it's more... like, who are we, why are we, why do we talk alike, why can we relate to their art and they can relate to our art, and why don't we do more of it. That's the exciting thing. And hopefully when this building is built it will deliver that message. And if it does, the architecture will be part of something bigger."

Clearly, including the arts and culture within the growing global movement towards prioritizing international collaboration and a new digital network of global cities would strengthen international relations as well as social and economic sectors.

FULLER PICTURE



Fig. 8. Buckminster Fuller with Fly's Eye Dome and Dymaxion Car, 1933, courtesy Buckminster Fuller Institute, © Buckminster Fuller Institute.

Buckminster Fuller, a renowned American visionary (1895 – 1983) spent his life working across multiple fields, such as architecture, design, geometry, engineering, science, cartography and education, in his pursuit to “make the world work for 100% of humanity.” He insisted on resisting monikers of specialization to describe his work, preferring instead to describe his output as that of a ‘comprehensive anticipatory design scientist’ – an emerging synthesis of artist, inventor, mechanic, objective economist and evolutionary strategist.

Fuller’s whole systems thinking and belief that “you never change things by fighting the existing reality – to change something, build a new model that makes the existing model obsolete,” has links to the 21st century ideas of Benjamin Barber, Badr Jafr and others who are working to create new models in business and governance that reflect integrity and society’s interdependence.

Although Buckminster Fuller professed a lack of interest in how his projects looked, he believed that a project at completion was beautiful if it possessed integrity, which to him was the key to aesthetics. Integrity is a crucial word in redefining art according to Fuller – integrity of individual communication independent of the medium of its articulation. Fuller believed that “the great scientists and great artists are not only subjective and pure but also objective and responsible inventors.” The creative process and a comprehensive outlook reflecting many disciplines leads to breakthroughs in solving the world’s problems.

THE POWER OF ART AS DESIGN: Motivating society to create a better interdependent world



Fig. 9. From *Serving Abroad...Through Their Eyes*, photography project by Lincoln Schatz, US State Department commission, © Lincoln Schatz.

Just as technology industries, corporations, foundations and policy makers are developing solutions to world problems, the arts and visual imagery can also be considered a practical problem solving design system.

Paola Antonelli, MoMA’s Senior Curator of Design and Architecture explains “design allows science and technology to become part

of people’s lives. Without it there would be too much distance between progress and reality, and so progress would be useless.” In other words, the arts delve into society’s psyche and emotions. They inspire, beautify, protest, educate, stimulate empathy and entertain, thereby influencing human perception and behavior. They stimulate creative thinking and invention. Images can communicate across cultures, transcending linguistic barriers and national boundaries. The contemporary imagery – or as I call it “contemporary hieroglyphs” – presented by Streaming Museum is analogous to ancient Egyptian pictograms as well as to the International System of Typographic Picture Education, known as *Isotype* developed by Austrian statistician Otto Neurath in the 1920s-30s.



Fig. 10. Otto Neurath, *Isotype* characters, created in Vienna during the 1920s and 30s, © Otto Neurath.

The Isotype characters were developed by Neurath to show social, technological, biological and historical connections in pictorial form. Neurath believed that the Isotype could be a universal picture language that would transcend national borders and help unify the world. The same can be said about music which brings people together around social and political issues.



Fig. 11. *Slurb*, by Marina Zurkow, 2009, © Marina Zurkow.

Scientists at Rensselaer Polytechnic Institute have found that when just 10 percent of the population holds an unshakable belief, their belief will always be adopted by the majority of the society. This can be relevant to the mission of Facebook founder Mark Zuckerberg to build the technology system that will bring the internet to the whole world: "Communities of people can channel their energy to do great things, and having connections between people is the infrastructure for the world to do that."

Considering the fact that the arts have the power to motivate people, the energy of these communities can be channeled using social media to solve some of the world's problems and to incentivize government and corporations to respond to the need for and create modernized infrastructure and social systems as well as commercial industries that benefit society.

Moreover, the metrics prove that art displayed in public space and cultural venues invigorates society's quality of life and the vitality of neighborhoods, cities and regions, which can incentivize program funders. Vital to the presentation of art is its placement and scale in relation to the structures and traffic patterns around it. The New York City-based organization Project for Public Space refers to well-planned public space as "placemaking" and has developed design guidelines that have been used in the creation of successful public spaces around the world. Placemaking, they say, has the potential to be one of the most transformative ideas of this century in the burgeoning field of social innovation and the design of new systems for solving social, environmental, economic and emerging nation problems.

THE POWER OF ART:

The science behind why and how it works

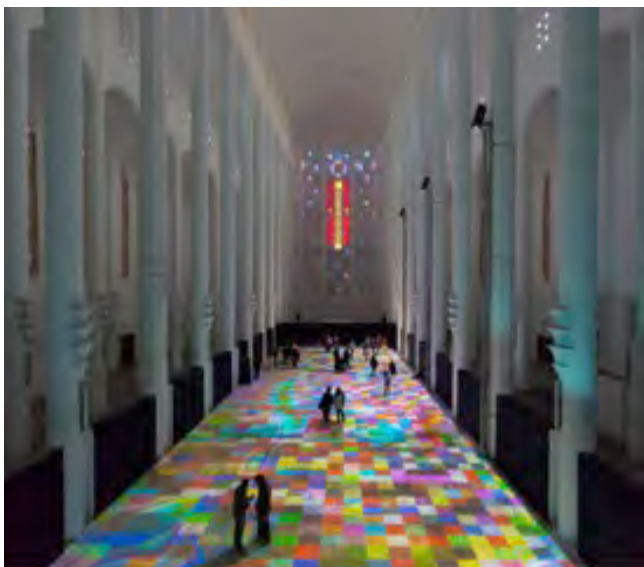


Fig. 12. Miguel Chevalier, Magic Carpets, 2014, interactive artwork at former Sacre Coeur Church, Casablanca, Morocco. Photo courtesy of the artist.

Understanding how aesthetics inspire and affect human perception, involves looking at the science that underlies how people process and are motivated by imagery and how their perception is shaped by their beliefs and cultural background.

Those aiming to communicate a message across the media about their ideas, mission or product can tap into relevant research that can help them shape content that will make a lasting impression - for example:

- A study conducted by the University of Georgia has proven that art is the best marketing tool because it aligns the subject with an image of importance, quality, longevity and craftsmanship that far surpasses the effectiveness of celebrity photos and commercial images.
- Neuroscience research at Case Western Reserve University has found that there is a connection between emotional experience and learning. Spectacular art that touches people's emotions will leave a lasting impression
- And at New York University researchers discovered that people only remember ten percent of what they hear, 30 percent of what they read, but about 80 percent of what they see and do.

Whether in a public outdoor space, a cultural venue or online, the ability of technology and social media to instantly deliver art content and transfer audience enthusiasm for an art experience to others around the world makes art a powerful real-time communication vehicle.

According to research at the Ehrenberg-Bass Institute at the University of South Australia, videos that elicit positive high arousal emotions – astonishment, elation, inspiration, hilarity, exhilaration – are shared more in social media than videos that elicit negative high arousal emotions.

Coca-Cola uses this high arousal positive emotions approach in its marketing strategy for expanding its product distribution to some of the most remote and economically depressed parts of Africa. They tap into local talent and culture to create aspirational imagery, music and messages tied to what makes people happy, promising that they will achieve the lives they want to live by creating their own businesses selling Coca-Cola. Pew Research Center reports that in emerging and developing economies, people's satisfaction with their material well-being has the biggest positive impact on their overall happiness.

Coca-Cola's marketing and distribution operation is so effective that aid organizations are using it to deliver supplies to places where Coke is delivered routinely but supplies of medicine, solar lights and other necessities have trouble reaching.

THE FUTURE

In a practical sense, collaboration between artists, corporations and organizations forms a perfect symbiotic. As Sandy Nairne, Director of the National Portrait Gallery in London explains, “Sponsorship is not a donation; it’s a deal. It has to work for the business as well as for us.”



Fig. 13. In Afghanistan, photograph by Teru Kuwayama, © Teru Kuwayama.

Sponsorship, when done correctly, is the modern iteration of 16th century Medici family art patronage that made Florence into the cradle of the Renaissance. Sponsor corporations or organizations – assuming they are properly aligned with the project they are facilitating and consent to display only their name and not an commercial imagery within or near the artwork, can therefore be considered the Medici family of the 21st century. Artists reluctant to work with for-profit corporations may reconsider it from this perspective.

“Contemporary art is an important way to understand the transformation of society and culture in our time,” said Robert Y. C. Ho, Chairman of the Guggenheim Museum’s The Robert H. N. Ho Family Foundation Chinese Art Initiative which explores the ideas and artworks from China. Contemporary art in all societies, he believes, “questions the status quo and makes people think about their world in different ways, gain deeper insight into contemporary society and culture, and where it is heading in the future.”

As Marshall McLuhan said in *Understanding Media: The Extensions of Man* (1964), “Art is a Distant Early Warning system that can always be relied on to tell the old culture what is beginning to happen to it.”

Since 2008 Streaming Museum’s exhibitions have symbolized global interconnectivity and reflected on the possibilities for the future. They have been viewed by millions of people around the world – from North Pole to South Pole, from metropolises to remote locales.

Art can be a leverage point within a complex system – a corporation, an economy, a living body, a city, an ecosystem – where a small shift in one thing can produce big changes in everything. I think that art is a world brand for the people – a brand that needs a new business model to expand its reach as both an inspirational and a practical design system for making a better interdependent world. The power of the arts can be activated by using the mechanisms of marketing and distribution systems of the most powerful world brands. “Don’t fight forces, use them,” Buckminster Fuller said in 1932. And now in 2014 and beyond, the forces of corporations, governments, organizations and the arts should work together in inspiring and creating this better world.

ENDNOTES

My invitation to participate in ISEA2014 came from Janet Bellotto, Interim Dean of the College of Arts and Creative Enterprises at Zayed University and Artistic Director for ISEA2014.

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REMAPPING THE CITY WITH THE EPHEMERAL NIGHT SKY

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ABSTRACT

The materialisation of the night sky resplendent with stars, constellations and galaxies has had a long association with the 4.5 billion year history of the Earth. This spectacle has inspired contemplative questions about our universe and our relation to it. Today due to increasing light and air pollution, most people living in cities are not aware of the gradual disappearance of the night sky, although it is still observable in unpolluted regions. In response, this paper explores unique methods of engagement with the celestial and terrestrial giving examples from historic and contemporary sources to re-establish the human connection with the firmament. Memorable public spaces always have an integral relationship between the earth, the sky and nature. They create a sense of belonging and assurance giving space to reflect on life, time and culture. To experience a full view of the night sky is where we measure ourselves against the immensity of the universe.

INTRODUCTION

I became involved with the multifarious *International Starlight Initiative* in 2007 in Spain, where I was asked to address the cultural significance of the night sky, along with colleagues who presented the scientific and environmental issues associated with the preservation of the night sky. [1] The same year, my artwork was selected as part of a public art project of light projections onto the surface of the 5000 square foot upturned dish of the Jodrell Bank Lovell Radio Telescope as part of its 50th anniversary celebration in the UK. It was a year that made me think about the two opposing activities the first to save the night sky and the other to project artificial light into the night sky, although the latter was an ephemeral event, I am still thinking about the two extremes. Today technology gives us the ability to see into deep stellar space and to look back at ourselves and our planet from space figure 1, below shows an image from NASA of the Earth at night, displaying the difference between the illuminated South Korea and the dark region of North Korea. Apparently, 'Earth is the only planet in our solar system that glitters at night' and it is expected to increase substantially over the next 40 years. [2]

THE SHADOW OF NIGHT

What is night actually and how is it formed? Walter Seitter, sets out an explanation beginning with the shadow of the Earth, known as the central umbra shadow. This shadow can be viewed from a higher ground after sunset in a clear evening sky, one may see a light to the west and yet the horizon and everything beneath it casts a sharp shadow, while to the east a grey cloudbank is visible above the horizon. This is the umbra shadow cast by the Earth, not yet clearly visible. A penumbra, a lighter shadow enfolds around the umbra shadow, which creates the vast dark shadow that we refer to as the night, covering

everything including an immense area of sky. This event creates two effects, the first is to remove sunlight from a large section of the surface of the Earth including the section of space above it and secondly it reveals starlight to the human eye, 'so the night on Earth functions as an optical basis for a view into space.' [3]



Fig. 1. The region of North and South Korea, 2012, Jessie Allen and Robert Simmons, Visible Infrared Image, courtesy of NASA Earth Observatory.

Seitter also posits that humans reproduce and multiply additional night spaces in the built environment using opaque building materials creating 'three dimensional nocturnes,' that are lit with artificial light. [3] This replication of interior night-time and artificial lighting can be applied to cinemas, theatres, planetariums, art galleries, art installations. The human fascination with light, today in all its forms, continues with the rise of contemporary light festivals conducted outdoors most likely have ancient origins with fire rituals and ceremonies. Along with the increased use of artificial lighting in cities, which includes the illumination of buildings, gardens, parks at night and sea fronts.

There are growing health concerns for humans, animals and all species living under the glare of the 24/7 day with the loss of the circadian rhythms of the daily cycle of day and night, issues like sleep disturbance and certain types of cancers may be related. There has been large-scale mortality of wildlife due to increased use of artificial lighting. As one example the migration patterns of birds are disrupted when flying over cities at night where flocks become disorientated in artificial light, reproduction and feeding are all affected. In response to disrupted flight paths the Tribute in Light Memorial in New York and numerous buildings shut down the lights on several occasions to allow birds to find their traditional flight orientation, using the and the horizon stars. Michael Rosenzweig speaks of 'reconciliation ecology' and advises 'fence mending and coexisting in harmony' to protect and strengthen the ecosystems/biodiversity within cities. [2] In addition the timing and duration of brightly lit

outdoor events need to consider ways to reduce the impact on the local nocturnal species. The manipulation of light and dark within the terrestrial environment overshadows the ancient human connections of cosmic alignment, which can still be found in cultural and spiritual practises, such as the following examples from Islam.

INTERNAL AND EXTERNAL TIME

Islamic Time

Mohamed Hedi Ben Ismail, when writing about The Universe Awareness Program in Tunisia, reminds us that Muslim 'children are raised within a social and cultural environment where the sky and the cosmos are part of their heritage.' Astronomy is embedded into their daily life with actually being conscious of it. In traditional terms the sky has been a source of inspiration and used as a guide for 'daily tasks' and spiritual observance. The position of the sun is observed to set the times for prayer five times a day, the observation of the polar star for guidance of the crescent moon to estimate the beginning of Ramadan when Muslims fast from sunrise to sunset. [4] Prior to the invention of mechanical clocks, as it was necessary to establish time, sundials had a central role in the Islamic world, both vertical and horizontal sundials were used. According to the Ottoman scholar Attila Bir, external sundials are now rare, except those embedded into the walls of mosques. [5]

Solar Observatories in the West

In the west too, it was necessary to stabilise time, to set the city's clocks in public spaces and standardise the calendar, in particular to fix the time for Easter with the spring equinox. 'The key parameter in the Easter calculation was the time of return of the sun to the same equinox.' The most powerful and way of measuring this cycle was to lay out a meridian line. Cathedrals were convenient and inexpensive locations for meridians as they were '[...] large and dark and needed only a hole in the roof and a rod in the floor to serve as solar observatories.' [6] In 1795, Giuseppe Piazzi received a commission to install a meridian, required to be 'very beautiful' to be mounted into the marbled floor of the Palermo cathedral in Sicily. [6] At that stage, Sicilian time was calculated on a more 'intuitive' basis from sunrise to sunset and thus there were many time zones throughout the island. The design of the meridian with a small hole – an oculus, was constructed in a minor dome to allow a beam of sunlight to project onto the floor at noon in winter and at 1pm in the summer, when the sun was higher in the sky. This corresponded with a meridian on the floor of the cathedral consisting of an elongated bronze line positioned north-south with both endings measured with the winter and summer solstices. 'The accuracy of the results depended on the care taken in installation: correct positioning of the hole, proper orientation of the floor rod and exact levelling of the floor.' [6] The signs of the zodiac made from inlaid marble are positioned along the meridian to mark dates in the year. Towards the northern end is Capricorn (winter) and towards the southern end is Cancer the crab (summer).



Fig. 2. Palermo Cathedral Meridian. 2013 Marea Atkinson, Digital image. © Marea Atkinson.

The Sundial at Team Disney Building 1990, Orlando, Florida in collaboration with Florida Solar Energy Center, USA.

The architect Arata Isozaki, designed the Disney administrative headquarters in Florida with a large sundial in the open-air cylindrical atrium, which also functions as a public space free for visitors to explore the notion of time. Isozaki and his team considered that the concept of time was important to Disney, as expressed in the theme parks of Tomorrowland, Frontierland, etc. Tylevich points out that the 'sundial atrium' is the key to the concept of the building raising the questions on the notions of 'spirit, cosmos and existence.' The building described as a 'postmodernist design' intrinsic with its 'ambiguity and negative space,' whereby '[...] the atrium has no prescribed use; its meaning and function beyond telling time, transform according to the individual.' [7] Midway there is a stone bridge intersecting the atrium suspended high yet below the sundial, embedded with quotes on time. To some it serves as a functional walkway between sections of the building reflecting on the value of time. To others observing people being in time or transiting through time across the bridge open to the elements under the dramatic shadow of the sundial inspires contemplation about the transitory nature of being and existence in time and place and within the universe. Charles Jencks on writing about cosmogenic architecture interprets the design as '[...] the sacred in the middle of the Empire of Trivial Pursuits.' He makes a comparison with the evolution theory of 'punctured equilibria' long periods of morphological stability with rare bursts of change and the qualities of the sublime 'the universe as simultaneously horrific and harmonic.' [8]

The sundial was collaboration between Isozaki and Dr Ross McCluney from the Florida Solar Energy Center. Upon seeing the design plan, (Fig. 4) McCluney, pointed out that shadows cast by objects in sunlight exhibit 'penumbra and umbra' effects, which would cause a certain amount of fuzziness of the sundial's pointer called the gnomon. Extensive testing and calculations were undertaken for the sundial to operate accurately and also the decision was taken to change the gnomon to an opaque sphere. [9]

REMAPPING THE CITY WITH STARLIGHT

Marea Atkinson - Art Projects

In response to an invitation to participate in a project titled *Dreams of a Possible City*. My aspiration would be to observe starlight above the city. In response I began to conceive of the idea of a fictional remapping integrating the metropolis with the sky. This project was exhibited at the Hayden Planetarium conference.



Fig. 3. Sundial, 3:30 PM on an equinox, Team Disney Building, 1990, Arata Isozaki, Image courtesy of the Florida Solar Energy Center, USA.

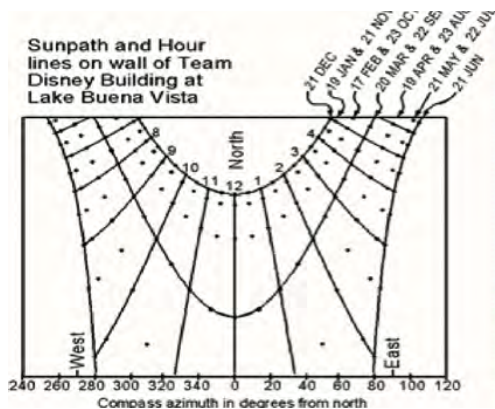


Fig. 4. Diagram of calculations for the sundial, Team Disney Building. Image courtesy of the Florida Solar Energy Center, USA.

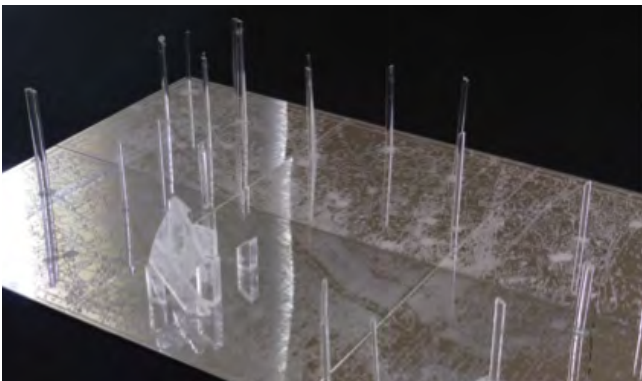


Fig. 5. *The City of Stars*, 2013, Marea Atkinson, Laser cut acrylic assemblage. © Marea Atkinson.

It was based on the Manhattan grid using a tourist map from 1929 collected by an Adelaide architect who had travelled to New York and walked the city. In 1929, a starry night sky would have been visible over New York. Today sometimes a star can be sighted at night from Central Park. The map was reworked and overlaid with a NASA image of an unidentifiable area of deep space, both images were laser cut onto acrylic glass (Figs 5, 6). In Stage 1 of the project, in the laser cut acrylic assemblage; the city map becomes the mirror of the sky, most of the buildings have been eliminated or repositioned underground and replaced with clusters of tall glass towers sensitive to capture light from ancient stars that may have dissipated; there are flat pools of starlight reserves collected on the ground and stored underground. These reserves will be used to create public spaces of underground chambers where people can reflect within and upon starlight. The light will also be stored as energy reserves to light the city. This project will be developed further in Stage 2.

Dubai Starfield (Fig. 7). As a newly established city in 1970's, the city has been remapped with zones of starlight reserves, eliminated the buildings and repositioned the cosmos to reflect in the ocean and the Creek. Fourteen tall glass structures are positioned with solar panels to gather energy.

Starfield Milan Digital print in figure 8, an antique map circa 19th century, of Milan is embedded with a NASA deep space image creating – a star field in the centre, the outer part of the map represents the terrestrial.

This work lead me to consider if at any stage in time, did city planners and architects consider the view of the night sky as an integral part of their planning? Today, city planning would not consider the consultation of the cosmos, except the solar cities projects around the world to relieve some of the congestion on reliance on certain energies. However there are examples from ancient practices whereby the city was designed to be in alignment with the cosmos, examples can be found in orientation of the Forbidden City in ancient China, the Egyptian and Mayan pyramids, Stone Henge, etc. This work lies in the field of archaeoastronomy, which examines the way people from the past have understood sky phenomena and how it manifested in their respective cultures. The following highlights features from the cities of Cusco and Machu Picchu.

Inca City Planning

The Inca cosmology was encoded into their city planning and architecture, as exemplified Cusco, the capital of the empire, which was planned by the emperor Pachacuti in 1440. The Milky Way was a key to their cosmology and was integrated into the city planning.



Fig. 6. Detail, *The City of Stars*, 2013, Marea Atkinson, Laser cut acrylic assemblage. © Marea Atkinson.



Fig. 7. Detail, *Dubai Starfield*, 2014, Marea Atkinson, Laser cut acrylic assemblage. © Marea Atkinson.



Fig. 8. *Starfield Milan*, 2014, Marea Atkinson, Digital print on paper. © Marea Atkinson.

The buildings as shown in figure 9, were laid out in a grid pattern, with straight lines *ceques*, emanating from the centre to four main regions in the empire called *syus*. [10] Gary Urton explains that the notion of a quartered cosmos was common across the Andes, as the division of the Milky Way was observed to change, from splitting into two during one season and then in another to divide

in a vertical fashion. [10] As the Incas believed that they were descendants from the Sun, the Temple of the Sun was prominent in Cusco and connected to a courtyard surrounded with separate sanctuaries, dedicated to the Moon, Stars, Rainbow, Thunder and Lightning. [11] Garcia Ferrari, posits that the topographical position of Machu Picchu, in figure 10, set high up, amongst a mountain range and near the clouds and elements, would allow 'a variety of viewpoints and connection to the surrounding landscape' and sky and thus many of its buildings were designed for 'solar, lunar and stellar observations.' Large public squares were a common feature in Inca cities, which were used for markets and festivals and demonstrations of justice. [12]

Manhattan Henge in alignment with the street grid, New York, July 2013.

It was surprising to find a contemporary event in New York recently that engaged the city plan, the public and astronomy. Around 7 pm on July 12th 2013, New York City police closed and cordoned off part of Forty-Second Street, for *Manhattan Henge*. Some time prior to sunset, people gathered excitedly and as the crowds grew each jostled for good viewing positions. They had come to witness the alignment of the Sun passing low in the sky and shining onto the city's east-west grid patterned streets on the Upper West Side. An annual event instigated with the timing and orientation calculated by the American Museum of Natural History and the Hayden Planetarium, whereby the street is littered with human arms holding up cameras, akin to ancient sunworshippers, following the movement of the Sun, thus the city street became a temporary public space to view the Manhattan solstice.

The Restoration of Starlight - Thierry Cohen - Darkened Cities Series.

There is a eerie quality about Cohen's work in the Darkened Cities Series, a pervasive ghostliness that evokes our ancient collective memory, with various reactions from shock to amazement and recognition of what we perceive and of what we have lost, the knowledge, beauty and contemplation of the night sky, as seen by our ancestors. Cohen reveals the invisible. There are layers of revelatory depths in his work exposing the visibility of the night sky above the world's contemporary cities, in the 21st Century.



Fig. 9. Plan of the city of Cusco, showing the central plaza and the division of the four quarters.



Fig.10. Machu Picchu, at twilight Martin St-Amant, 2009, Digital Image, Courtesy of Wikipedia-CC-BY-SA-3.0.



Fig. 11. Shanghai 31° 14' 39" N 2012-03-19 LST 14:42 , Thierry Cohen, from the Darkened Cities series. Courtesy The Danziger Gallery, New York & East-Wing Gallery, Dubai © Thierry Cohen.

Firstly, the shock and almost dis-belief of the images showing the magnificence of the night sky brilliant with stars, constellations and the Milky Way, over the contemporary cities of Shanghai, Tokyo, Berlin, Rio, Sao Paulo, Paris, etc. In Figure 11, Shanghai appears to be in deep slumber, as the night quietly passages over the city revealing its brilliant jewels of light encrusted in blackness. These images are carefully composed and not just constructed with a random image of a night sky, superimposed over the city. As noted by Francis Hodgson, Cohen photographs the city in daylight to avoid artificial light and travels to a remote location on the same latitude as the city and photographs the night skies in remote areas like Mongolia, Mojave Desert, which '[...] are the very ones visible above cities a few hours earlier or later.' [13] Cohen as a contemporary pilgrim makes journeys to restore the starlight above cities reuniting the firmament with the metropolis for the contemporary audience. The work becomes a witness to what humanity has lost. The Milky Way still has a significant role in the enduring indigenous world cultures and in spiritual beliefs of the past.

Pilgrimages and the Milky Way

Cohen's expeditions evoke the ancient pilgrimages when the Milky Way was used as guidance for pilgrim routes, at times connected with the Hajj in Islam and the Christian pilgrimages in Europe. One example is the route along the northern section of the Iberian Peninsula to Santiago de Compostela in Galicia, the Milky Way was used to guide the pilgrims in an East-West direction, to their destination. [14] This particular route was revived in the 1970's and is still named The Way and there are many symbolic references to the significance of stars and constellations, associated with the route, where the night sky had a significant role with the belief systems at the time.

PUBLIC SPACE AND PUBLIC SKY IN DUBAI, UAE.

The relationship between settled and transitory communities has a long history in the Bedouin culture. The word Bedouin actually means desert dweller. The Bedouins held the belief that the transitory lifestyle maintained the dignity of the human spirit, rather than leading a settled life. [15] This culture of the transient where temporary shelter is used for rest, relaxation and the hospitality given to strangers can be linked to the mobility of people today who work and travel the globe and where people feel at home in a number of places.

Dubai has created an extraordinary city within the desert. The Dubai Museum has a section about the Arabic relationship to the sky, the Arabic names for stars, used for location, navigation, planting, timing for prayers, water irrigation, tent orientation, etc. The Arabic contribution towards knowledge is significant, in particular astronomy. The museum makes a concise statement about the quality of clear skies in the UAE. The country can become a leader in the region to protect the acknowledged resplendent views of the night sky and the Milky Way in the remote desert. It is important for the young generation to be educated in the traditional and contemporary knowledge of astronomy and to be given regular experience of these magnificent skies. Recent initiatives to protect the firmament have arisen and the UAE can consider creating partnerships with the International Dark-Sky Association formed in 1988, to bring public awareness to combat light pollution, with alternative forms of artificial light, the use of down lighting, as opposed to up lighting, low sodium lighting to reduce glare, etc. In 2001, the city of Flagstaff, Arizona, USA became the first International Dark Sky City. In 2007, the International Starlight Initiative was formed to defend the quality of the night sky and the right to observe the stars for future generations. The UAE can consider setting up a particular region as a Starlight Reserve, using the example of the New Zealand enterprise that created the Aoraki Mackenzie International Dark Sky Reserve, which received UNESCO World Heritage status in 2012 to protect the skies in association with the Mt John University Observatory. Figures 12 and 13.

The design and location of public space in Dubai will be subject to climatic conditions and could engage both exterior and interior

spaces. The abundance of sunshine in the UAE creates the perfect location for a large open-air sundial, as discussed in the example from the Disney Sundial in Florida. It is essential that artists be involved in public space and working with multidisciplinary teams, lighting designers, scientists, writers, ecologists to investigate the relationship between the city and the desert, to explore ideas, in sound, installation, performance, video, kinetic art, visual art, etc, to create a comprehensive and continuous engagement of knowledge using contemporary art in public spaces to act an instigator of questions and new knowledge, drawing on a range of multi-disciplinary fields and taking into consideration the ecological impact.



Fig. 12. Mount John University Observatory, Maki Yanagimachi/Earth&Sky Ltd, New Zealand. Digital Image, © Maki Yanagimachi.



Fig. 13. Sunset at Mount John University Observatory, Dallas Poll/Earth&Sky Ltd, New Zealand, Digital Image, © Dallas Poll.

The most remarkable public spaces always have the presence of nature and a relationship between the earth and the sky. I am reminded of the great courtyards in the grand mosques, where people transit through the elements of air, wind, sun and heat, to the protection of the interior. The use of Islamic screens to give privacy and protection from the sun, with the filtered patterned light creating an ambience of contemplation. I think of the public squares of Spain and Italy, where there is a changing nature of events - markets, music, performances, art installations, open-air

cinemas, festivals, etc. There are places to sit, read, write, think, converse and observe, while the space functions throughout the passage of the day to night. Well-designed public spaces are always engaging, memorable, welcoming and free to enter. We use public space for reflection on time, life and culture.

Today, as a large percentage of the world's population have never seen the Milky Way and once sighted, the visceral experience is transformative, it is worth fighting for its preservation for future generations. It is important for countries like the UAE to educate the young with the knowledge of the night sky creating a link between the city and the desert. Standing on the earth looking up at the sky is the moment when people are reunited with their 'evolutionary' and 'cultural inheritance' [...] 'where we measure the scale of our being against the dimensions of a deep night sky under the arc of the 'Milky Way.' [16]

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SENSING SCIENCE: THE MICROSCOPIC ENVIRONMENT

Cynthia Beth Rubin, Rhode Island School of Design, Providence, USA

ABSTRACT

Hudson Valley Muddy Waters is an interactive augmented reality work engaging the public space of our environmental waters as subject, inviting viewers to enter the world of microscopic life. With imagery constructed with an artist's sensibility, it engages science while revealing the hidden but vital microscopic creatures comprising the most basic part of our food chain and our world.

ENGAGING PUBLIC SPACE

Public space is often thought of as commercial space, as the space where we mingle with other people when we need to buy food and clothes. The term evokes images of busy streets teeming with humanity. These spaces are the opposite of the space of our homes, where we are engaged in the interior life of small family groups or even solitary thinking. Today, as many people increasingly live in urban spaces with limited access to the space of nature, we increasingly think of public space as city parks, beaches, long stretches of open land and deep forests.

What are our thoughts as we move through public spaces? Are we in our own worlds or do we engage the history and meaning of the location or even focus on the community around us? Artworks have long served as the catalyst to move our thoughts into the realm of that shared emotional space where the sense of community overtakes the private space of whatever we might have on our minds.

Large monumental memorials traditionally dominated the public art realm. These were created to serve a specific purpose: to prompt the public to remember important people and events that were considered too important to be forgotten. They served as a bridge from present to past, but also as a trigger for deeper thoughts about the connection that each of us has to the world beyond the personal.

Although the subjects and media of public art have long been expanded to include a number of approaches, the overriding goal remains. In the best of these works, the art stimulates new ideas and ways of thinking about the world and our place in it. The goal is not decoration, it is the stimulation of conceptual exploration and this is the same goal that motivated the creation of *Hudson Valley Muddy Waters*.

PUBLIC SPACE OF OUR WATERS

The public space of our waters is a different kind of space. Water is a shared resource, one with which we cannot live without and a space to which many of us are naturally drawn. What we see at water's edge, however, is not the whole story. Much of the story of water is experienced in scientific laboratories, which are not public spaces. This is especially true when it comes to the vital microscopic life of the waters, the story of plankton.



Fig. 1. *Hudson Valley Muddy Waters*, 2014, Cynthia Beth Rubin, digital print, © C. B Rubin.

Hudson Valley Muddy Waters offers the viewers the opportunity to explore the normally invisible and therefore less accessible story of water that is part of the laboratory experience. By employing Augmented Reality to simulate the process of discovery, it engages the public in new ways that echoes the excitement of looking under a microscope.

The viewer begins with an artistic image that is composed to give the impression of discovering muddy waters in the forest. Then the viewer looks not through a microscope, but rather searches this wall-mounted print with a mobile device.

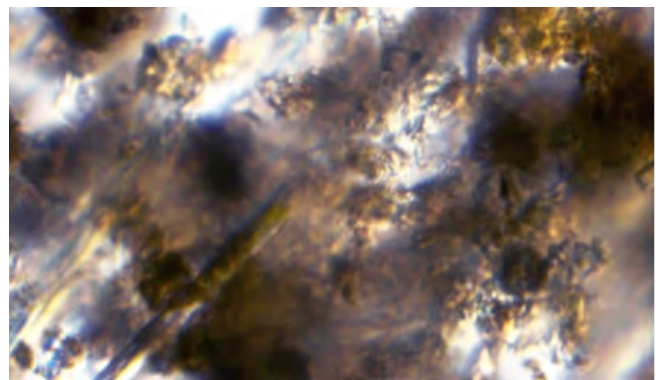


Fig. 2. Micro-capture of Plankton from the Hudson Valley, 2013, Cynthia Beth Rubin, photograph, © C. B Rubin.

The short videos triggered by specific locations on a wall print are at both the micro and macro level. The majority of the videos show plankton swimming in the water, in imagery that is digitally processed for clarity and appeal but still scientifically accurate in representation. The work also triggers macro videos of the environment, imagery of the trees and the running water that is again only digitally processed for clarity and appeal. In the way

the wall print is not just a physical trigger for other imagery, but a conceptual trigger as well. The impetus to explore imaginatively comes from an imaginative, creative artistic image.

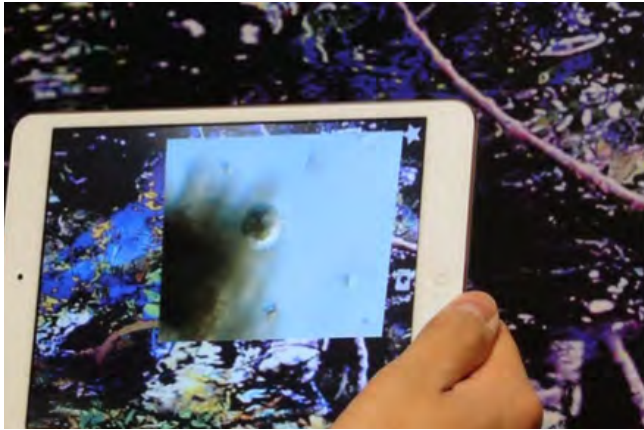


Fig. 3. Detail with Augmented Reality user Hudson Mud and Water, 2014, Cynthia Beth Rubin, Digital Image, © C. B Rubin.

SUMMARY: TRUE SCIENCE, STILL ART

Artists working with scientists face basic common questions: What kind of art will stimulate the public to think deeply about the water that is vital to our lives? Furthermore, how do we address the problem of staying faithful to scientific accuracy while infusing imagery with the sensibility of an artist?

The use of Augmented Reality provides an ideal vehicle for creating a conceptual conversation between creative imagery and what is considered scientifically accurate representation, that is representation as it comes through a camera lens and built-in camera software and frozen at a particular moment in time. We all know the arguments put forward by Roland Barthes of the frozen moment of photography and short videos do not do much more to expand that moment. [1] The added layer of the interpretative work of an artist in conjunction with “real” imagery may break the unreality of photographic representation.

Hudson Valley Muddy Waters reverses the usual relationship of reality and imagined space by using a visually enticing space as the point of departure. From here, the user embarks on the journey of discovery in a fashion echoing the experience of looking through a microscope to discover the life forms in water.

The source material for the artistic imagery, as well as the videos of microscopic life, are all derived from the same location in the Hudson Valley of New York State in the U.S.A. The project was begun during an artist residency made possible by Art Kibbutz. The microscopic imaging part of the project was undertaken at the Edna Lawrence Nature Lab at the Rhode Island School of Design, with equipment purchased with funding from Rhode Island EPSCOR (Experimental Program to Stimulate Competitive Research). Scientific advice for the project was generously

provided by members of the Menden-Deuer lab at the Graduate School of Oceanography at the University of Rhode Island.

The work is viewable, with AR triggers, at:
<http://cbrubin.net>

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ENDNOTES:

The full final version of this installation was subsequently exhibited at: ACM Creativity and Cognition 2015, June 22 - 25, 2015, Glasgow, United Kingdom

SOUND: VOLATILE: METOPIA

Eva Sjuve, Royal College of Art, London, UK



Fig. 1. Eruption of Eyjafjallajökull, Island 2010.

Metopia (meta + topos, the place beyond) is a research project using a wireless sensor network and sonification to examine environmental hazardous dust and air pollution. Microscopic matter, invisible to the human perception, traverses the human body, through the air we breathe and through our skin, such as bacteria, dust and other airborne particles, such as volatile organic compounds, both biological and anthropogenic. According to the World Health Organization, WHO, an estimated 3.7 million people died from premature deaths from outdoor air pollution, due to the exposure of particulate matter with a size of 10 microns or less. [1] Figure 1 shows the eruption of Eyjafjallajökull on Island in 2010, which caused exposure to natural dust. Political conflict using firearms and explosives causes exposure to particulate matter, mostly anthropogenic, have a deep impact on the human respiratory system. Metopia is using measurements from sensor data so we can experience the information of hazardous dust through the use of sound.

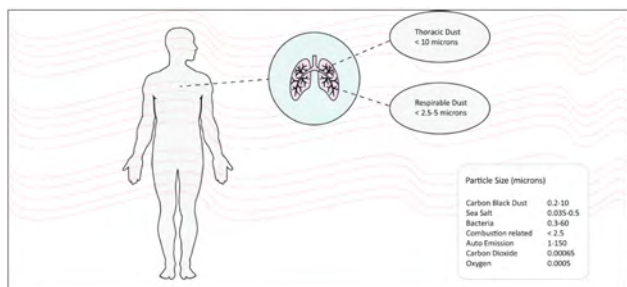


Fig. 2. The human respiratory system and particles measured in microns.

What we breathe have a continuous impact on our bodies and on our behavior. Figure 2 shows the human respiratory system and particles sizes measured in microns. One third of the world population is exposed to biomass fuels, which causes respiratory problems. [2] Other sources of exposure of particulate matter come from Industry, transport, energy production, waste

management and urban planning. [1] Figure 2 shows a diagram of the human respiratory system and gives examples of particle sizes. Thoracic dust of sizes less than 10 microns can enter the lungs but airborne particles less than 2.5-5 micron can also enter the blood-stream. One other aspect that is addressed in this project, other than the quality of air and health issues, is the economical and political framework in relation to the concerns around air pollution and how information around this matter is handled.

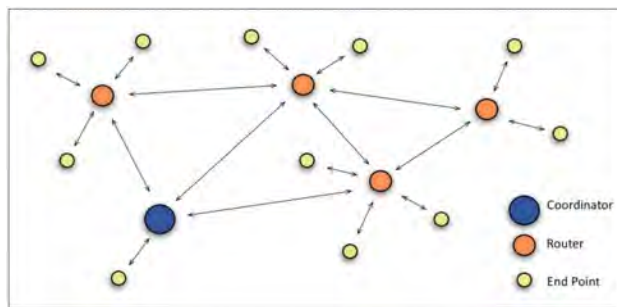


Fig. 3. Topology of a scalable Wireless Sensor Network.

In *Sound: Volatile: Metopia*, the complex volatile processes of air pollution in our environment is addressed through the use of a range of sensor technologies, including Volatile Organic Compound (VOC) sensors and dust sensors, to experience the data of the measured air pollution. The changes in toxic levels in the environment are used as data in a sound composition to be experienced by the general public. This wireless sensor network project consists of a mesh network, using ZigBee devices, which uses a routing protocol on top of 802.15.4. It is a low-power, scalable network, which may cover a large area of the city. [3] Figure 3 is showing the topology is this wireless sensor network. The sound composition is using Pure Data, an open source, visual programming environment. Pure Data is highly portable and can be used on various operating systems and portable devices. [4]

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EDUCATIONAL FORUM



THE ISEA2014 EDUCATIONAL FORUM

Nina Czegledy

The ISEA2014 Education Forum was held at the American University in Dubai (AUD).

Welcome by Janet Bellotto, Artistic Director, ISEA2014 and Peter Anders, Chair, ISEA International.

In the context of the ISEA2014 Education Forum the theme of *Location* referenced sites of pedagogical variance including cultural similarities/differences as well as diverse socio-political issues. The presentations confirmed that global education systems remain under a considerable amount of pressure partly due to administrative complexities, partly to technological developments and to a certain extent the emerging trend of monetization. Current tactical tendencies point towards convergence, however while cross-disciplinary studies are valued in theory, this is not necessarily translated into practice, said Deborah Lawler-Dormer, PhD Candidate, University of Auckland, New Zealand. She outlined the complications and necessary strategies to pursue interdisciplinary cross-departmental studies. Deborah also noted that some useful thoroughly integrated interdisciplinary workshops and program models exist, where students have access to experts for their chosen topics.

We heard about the growth of interdisciplinary labs within Art and Design faculties at various universities from Lynn Hughes, Research Chair in Interaction Design and Games Innovation at Concordia University, Montreal. The Techno Culture Art and Games TAG. Lab where she is Associate Director, presents a radically interdisciplinary model for such an open, non-hierarchical, bottoms-up lab.

It was noted that students today have a preferred mode of activity and interaction that is frequently not in synchronization with traditional educational systems. "We need to have a closer more flexible engagement with students, their needs and concerns. Administrators have to be convinced of these requirements. While some people (including academics) are still scared to use technology – it should be noted that it is an amazing experience to facilitate new technologies in teaching" – affirmed Brad Moody, Associate Professor of Digital Media, from our host, the American University in Dubai.

Caroline Langill, Associate Dean, Ontario College of Art and Design University, Toronto, discussed modes of learning and delivery. She noted that there is a growing pressure to create entrepreneurs. Now that American artists have businesses – she said – the same pressure exists in Canada. Commercialization is a problematic issue, however several profound concerns and questions also remain open. What kind of art do we really want, what is our task in relation to the ubiquity of technology? "What

is going on?" asked Cornelia Sollfrank, Lecturer in Art & Media, University of Dundee. She is concerned that at Dundee various faculties, including Design, Media Art and Fine Arts were combined until Fine Arts gradually disappeared.

On an entirely other topic Ian Clothier, Senior Academic, Western Institute of Technology at Taranaki, New Zealand (presented by Deborah Lawler-Dormer) commented on culture and frameworks, on adaptability and the recognition of cultural constructs. He compared Western attitudes to a Maori approach, noting that great care is needed when critiquing work particularly work that straddles cultural boundaries. The theme of inter-cultural constructs and informal knowledge transfer also informed Tracey Bentson, Adjunct Fellow, Australian National University School of Music's contribution. She quoted her personal experience with the Yorta Nation Aboriginal community collaborating with academic researchers. In this context, the defined role of student and teacher become blurred. Her most valuable lesson was that relationships come first when working with indigenous peoples.

Socio-political issues inspired Shady El Noshokaty's (Associate Professor, American University in Cairo, Egypt) comments: Education is just another weapon! Education means a better life – claimed Shady. When social media started to surface in Egypt (2002-2003) a new generation quickly gained a global sense. This is a mostly self-educated generation gaining information from the Internet and forming small social media groups. In the last 10 years their anger grew. New media was a powerful part of worldwide knowledge, excluded by the regime. Students loved the virtual world. A good education – he concluded – is to produce people who have the power to change the future.

Maryam Ibrahim Mohammad Humaidan Bin Humaidan, of Zayed University, Dubai provided very interesting comments from a student's point of view. Maryam as a graphic designer, looks for resources for her studies. However, she finds that the library is not very useful – so she searches on-line. While she loves books, but she can't find easily the books she needs on Graphic Design. Maryam thinks that instructions should include technology! Maryam wants to know how to program and how to do everything herself. She also recalled how last year Janet Bellotto brought a sound artist to class. This was a very surprising experience!

Due to shortage of time and the impending journey to Abu Dhabi there was not enough time for a broad discussion. Nevertheless we had a few comments including Peter Hasell, Instructor, Zayed University, Dubai, who remarked that what individuals do is very important and becomes relevant through art. Travelling and learning around the world, students gain confidence in what they do, thus they don't have to rely only on gallery or other systems.

The presenters and the audience at this Forum gathered from locations around the globe providing wide-ranging viewpoints on educational and cultural environments based on their personal experience. Due to these highly interesting, but eclectic contributions one can report on the event, however it is difficult if not impossible to draw conclusions.

Sincere thanks are due to the all the presenters organizers and most of all the audience for their devoted participation in the ISEA2014 Education Forum.





INDEX OF AUTHORS

Aaron Oldenburg

Aaron Oldenburg is a game designer and new media artist whose primary interest is in game rules as an expressive medium. His video and interactive work has been exhibited in festivals and galleries in New York, Berlin, São Paulo and Los Angeles, including SIGGRAPH and FILE Electronic Language International Festival. He teaches game design as an Assistant Professor in University of Baltimore's Simulation and Digital Entertainment program and has an MFA from the University of Maryland, Baltimore County. In October 2003 he finished two years as an HIV Health Extension Agent for the Peace Corps in Mali, West Africa.

Adam Nash

Adam Nash is a Melbourne-based artist, composer, programmer, performer and writer in virtual environments, real-time 3D and mixed-reality technology. He explores virtual environments as audiovisual performance spaces, data/motion capture sites and generative platforms. His work has been in galleries, festivals and online worldwide, including SIGGRAPH, ISEA, ZERO1SJ and the Venice Biennale. He lectures in the Bachelor of Design (Games) at RMIT University.

Ajay Kapur

Ajay Kapur is currently the Director of the Music Technology program (MTIID) at the California Institute of the Arts, as well as the Associate Dean for Research and Development in Digital Arts. He received an Interdisciplinary Ph.D. in 2007 from University of Victoria combining computer science, electrical engineering, mechanical engineering, music and psychology with a focus on intelligent music systems and media technology. Ajay graduated with a Bachelor of Science in Engineering and Computer Science from Princeton University in 2002. He has published over 80 technical papers and presented lectures across the world on music technology, human computer interface for artists, robotics for making sound and modern digital orchestras. His book 'Digitizing North Indian Music,' discusses how sensors, machine learning and robotics are used to extend and preserve traditional techniques of Indian Classical music.

Alexandre Lupien

Alexandre Lupien is a technology designer at Moment Factory, a new media and entertainment studio specialised in the conception and production of multimedia environments combining video, lighting, architecture, sound and special effects to create remarkable experiences. Interested in using technologies to explore new ways of facilitating interaction between people, he advocates an organic approach that focuses on enhancing the natural behaviours of human beings in public space.

Alexia Mellor

Alexia Mellor is an international, interdisciplinary artist with roots in the UK and USA. Mellor uses humour and performative strategies to investigate issues of security, displacement and identity in an increasingly mediated landscape. She transposes familiar institutions into unfamiliar contexts to initiate direct participation in deconstructing social norms, consumer culture and notions of place. She recently relocated to

Newcastle (UK) to pursue a PhD at Newcastle University after having co-taught an art-science course in Saudi Arabia and serving as Artist-in-Residence in Pontypool, South Wales where she investigated practice-led research models and regeneration.

Andrea Sosa

Andrea Sosa Graduated in Multimedia Design (UNLP) and Filmmaking (UNLP), she is currently Professor and Researcher at Multimedia Design Department, Faculty of Fine Arts, National University of La Plata (Argentina) and the Transdepartamental Area of Multimedia Arts at the National University Institute of Art in Buenos Aires (Argentina). She works in the field of interactive arts exploring the relation between the physical and the virtual and focusing on the possibilities of collective interactivity.

Andreas Guskos

Studied architectural design at the Department of Architecture, Szczecin University of Technology in 1993-1998. In 2008 received a PhD degree in art from The Eugeniusz Geppert Academy of Fine Arts in Wrocław by presenting a dissertation: Architecture in the space of information. In 2013 applied for a Doctor of Science degree by presenting the work Aheilos virtual world. Creation and education in the space of information. Working in the fields of architectural design, graphic design and media art. Currently holding a position of Assistant Professor at the Visual Arts Department of the Academy of Art in Szczecin.

Andreas Simon

Andreas Simon is a Senior Researcher and Lecturer at the Institute for Research in Art and Design at HGK FHNW in Basel, Switzerland. He has studied Computer Science at Technical University Berlin and the MIT Media Lab in Boston. He holds a Diploma degree (Dipl. Inform.) of Technical University Berlin. Andreas' main research interest is in interaction design, with a look at how interactions with computers influence users' behavior and affective state, as well as the application of computer mediated collaboration between people.

Andreia Machado Oliveira

Ph.D from multidisciplinary Ph.D. Program at UFRGS and at the Université de Montréal (Canada); MA in Social Psychology, UFRGS; BFA, UFRGS (Brazil). Professor in the Graduate Program of Visual Arts and Chair of ICT in Education in UFSM, Brazil. She is currently Chair of the InterArtec/Cnpq research group and of the Interdisciplinary Interactivity Lab (LabInter) and member of the Educational Technologies workgroup at UFRGS, Brazil and The SenseLab research-creation group at Concordia University, in Montréal, Canada.

Angela Davies

Angela Davies is an interdisciplinary artist based in Wales. Her work is underpinned by themes of time and place; in particular the changing ecologies of the natural and manmade environment. Craft disciplines and creative technologies are drawn upon to create site-specific multi-sensory interventions. Davies graduated from Manchester Metropolitan University in 2000, with a BA (Hons) degree in Contemporary Crafts. In 2013, she graduated from Manchester School of Art completing a Masters in Textiles.

Annette Weintraub

Annette Weintraub is a media artist whose projects embed layered narratives within a variety of architectural constructs. Her work investigates architecture as visual language, media and public space and the symbolism of space.

Annie On Ni Wan

Annie Wan is an international media artist, often creates artworks focus on relationships between spaces and sites, materials and immaterial. At the City University of Hong Kong she earned a Bachelor of Arts degree in Creative Media and a Master of Science in Applied Information Technology (Art and Technology) from Chalmers University of Technology, Sweden. In 2012 she earned a Doctor of Philosophy at the University of Washington in Digital Arts and Experimental Media, United States. She mostly works with locative media, embedded electronics and network-based systems.

Anthony Schrag

Anthony Schrag was born in Zimbabwe and grew up in the Middle East, the UK and Canada. Originally, he obtained a degree in Creative Writing in Canada, where his first poetry book was published, but forwent the solitary writer's life for an interdisciplinary artist's fare and completed his MFA in Glasgow in 2005.

Atteqa Ali

Atteqa Ali is an art historian, writer and curator based in Abu Dhabi. She has written articles and essays for several publications, including the anthology *Contemporary Art: 1989 to the present* (Wiley-Blackwell). She has curated exhibitions internationally, including *Playing with a Loaded Gun: Contemporary Art in Pakistan* at Apexart Curatorial Programs in New York and Kunsthalle Friedricianum in Kassel, Germany. Attiqah Ali is currently an Assistant Professor of Art History at Zayed University.

Beverley Hood

Beverley Hood is a media artist, researcher and lecturer. Her research practice over the past fifteen years has studied the impact of technology on relationships, the body and human experience, through the creation of practice based projects and writing. Beverley studied Sculpture and Electronic Imaging at Duncan of Jordanstone College of Art, Dundee and Nova Scotia College of Art & Design, Halifax, Canada.

Boris Debackere

Head of V2_Lab. Artist and sound designer for film. Co-curator of the Dutch Electronic Art Festival.

Breno Bitarello

Breno Bitarello is a tattoo artist and a Ph.D student at Mackenzie Presbyterian University (Education, Arts and History of Culture program). His research interests are tattoo and tattooing; drawing and painting; interactive arts; art, science and technology; interaction design; concept design and game design.

Byeongwon Ha

Byeongwon Ha studied Film, Television and Multimedia from SungKyunKwan

University, South Korea. After receiving his BFA, he created interactive media and experimental films in the graduate study of Media Art from Yonsei University, South Korea. With the thesis project award, he also received an MFA in Digital+Media from Rhode Island School of Design. After graduation, he studies indoor-air-quality-mapping in digital media as a member of the Public Laboratory for Open Technology and in Science. Now he is pursuing his PhD degree, the Media, Art and Text program at Virginia Commonwealth University. Based on his academic experiences, he creates diverse algorithmic films and interactive installations.

Caitilin de Bérigny

Caitilin de Bérigny is an artist and researcher in the Design Lab, University of Sydney. She has studied, lived and worked in Paris and Marseille in France and as an international filmmaker based in the United States. Her experimental artworks address crucial social, cultural and environmental issues. She has led major cross-disciplinary research projects including: *InterANTARCTICA* and *Reefs on the Edge*.

Cecelia Cmielewski

Cecelia Cmielewski produces artworks where social, technological and cultural engagements intersect to encourage new understanding across knowledge systems. She realises these artworks as an artist, curator and manager. She holds an MBA (University of Adelaide), Bachelor of Design (University of South Australia) and a Bachelor of Arts (Flinders University).

Chris Barker

Chris Barker is a Software Engineer, Game Developer and Digital Artist. A graduate of Plymouth University with a BSc (Hons) degree in Digital Art and Technology, Chris's primary focus was in mobile locative media and pervasive computing. Since finishing his degree in October 2012, Chris has been employed at the Edinburgh College of Art, Edinburgh University under the supervision of Prof. Chris Speed. Recently Chris has developed web applications for the AHRC Connected Communities project 'Memories of Mr Seel's Garden' and the AHRC funded 'Cinematic Geographies of Battersea'.

Chris Speed

Chris Speed is Chair of Design Informatics at the University of Edinburgh where his research focuses upon the Network Society, Digital Art and Technology and The Internet of Things. Chris has sustained a critical enquiry into how network technology can engage with the fields of art, design and social experience through a variety of international digital art exhibitions, funded research projects, books, journals and conferences.

Christa Sommerer

Christa Sommerer is an internationally renowned media artist and researcher and pioneer of interactive art. She is a Professor and Head of the Department for Interface Cultures at the University of Art and Design in Linz, Austria.

Christiane Heibach

Christiane Heibach is currently Research Fellow at the Basel Institute of Research in Art and Design (University of Applied Sciences and Arts Northwestern Switzerland) and at the Karlsruhe University of Arts and

Design. With a background in German Literary Studies she completed her PhD at the University of Heidelberg in 2000 with one of the first studies on internet literature.

Chung Kon Shi

Chung Kon Shi is a Professor at KAIST (Korea Advanced Institute of Science and Technology), Department of Humanities and Social Sciences, Graduate School of Culture and Technology.

Claude Fortin

An interdisciplinary scholar with a background in the humanities, social sciences and fine arts, Claude Fortin is a junior researcher at the Making Culture Lab, an applied design research hub affiliated with Simon Fraser University's School of Interactive Arts & Technology (SIAT). With an emphasis on civic participation, community and culture, her engagement with interaction design is premised on understanding and developing the spatial aesthetics and social potentials of digital screens and media façades in urban environments.

Clea T. Waite

Clea T. Waite is a research artist scholar and experimental filmmaker whose motion pictures balance unconventional aesthetic exploration with innovative realisation. Her somatic, cinematic works explore immersion, stereoscopic imaging, spatial montage and unique interfaces, as well as one inter-species collaboration with several hundred spiders. Waite graduated from the MIT Media Lab as a physicist and computer graphics developer. She was founding Associate Professor of Digital Montage at the Academy of Film and Television Babelsberg, Germany and has held positions at the Pratt Institute, New York and the University of Arts, Berlin. She is now pursuing her PhD at the USC School of Cinematic Arts in Media Arts and Practice.

Cornelia Sollfrank

Cornelia, is an artist and researcher, associated with the Duncan of Jordanstone College of Art and Design in Dundee, Scotland. She is a pioneer of net.art and has a long-standing experience in researching the possibilities and limitations of the networked digital space for art.

Cynthia Beth Rubin

Cynthia is a new media artist working in still imagery, video and interactivity. Trained as a painter, she began working in digital imagery in 1984, before the days of easy scanning and digital photography. While still enmeshed in the thinking of abstract expressionism, her search for new influences led her first to Islamic Art and eventually to Hebrew and then Christian manuscripts and the historic sense of place. Recently, this sense of place has led to an exploration of the hidden microscopic life in our waters and she became an honorary artist in residence in the Menden-Deuer lab of Oceanography at the University of Rhode Island.

Daisyléa Paiva

Ph.D. Student, Neurophysiology, Federal University of São Paulo.

David Bouchard

David is an omnivorous New Media artist, technologist and educator. His

work explores the expressive potential of computation, both in software and hardware forms. His research interests include generative art, data visualization, interactive and responsive environments, digital fabrication, display technology for public spaces, electronic music interfaces and wireless sensor networks, to name a few. He is currently an Assistant Professor of New Media within the RTA School of Media at Ryerson University. He holds a Bachelor of Computer Science from Concordia University and a Masters of Media Arts & Sciences from MIT.

Elizabeth Granados Salgado

Computer Engineer, an expert in multimedia development has worked as Production Media Virtual University UAM (Autonomous University of Manizales), developed projects coordinated by the UNDP (United Nations Project for Development). Winner of a national award from the Ministry of Education OVA (Virtual Learning Objects) has been Professor of certification courses Adobe Flash. Currently teaching in the Department of Visual Design at the University of Caldas.

Erkki Huhtamo

Erkki Huhtamo is known as a founding figure of media archaeology. He has published extensively on media culture and media arts, lectured worldwide, given stage performances, curated exhibitions and directed TV programs. He is a Professor at the University of California Los Angeles (UCLA), Departments of Design Media Arts and Film, Television and Digital Media.

Esteban García

Esteban García Bravo is a Colombian born artist who researches computer art history and digital media art practices. He earned his MFA from Purdue University in 2008 and a Ph.D. in Computer Graphics Technology, also from Purdue, in 2013. His research has been featured in the annual meetings of international organizations such as SIGGRAPH (2011) and ISEA (2012, 2013), as well as in the publication Leonardo Journal of Art, Sciences and Technology. García has participated in artist-residency programs including Estímulos (Colombia/Venezuela, 2004), Lugar a Dudas (Colombia, 2007) and 8550 Ohio (USA, 2013).

Eva Sjuve

Eva Sjuve is a media artist and composer. She creates interactive media technologies to reveal hidden structures in the intersection between the wireless sphere and the real world. She has been developing open source digital technology for the purpose of addressing contemporary issues.

Falk Heinrich

Falk Heinrich, PhD, Associate Professor at Aalborg University, Denmark, Head of Studies (School of Communication, Art and Technology). Falk Heinrich holds a MA in dramaturgy and multimedia and a PhD in interactive installation art. He teaches art theory and aesthetics, interactive dramaturgy and artistic methodology. He worked as a theatre actor and director and installation artist. His theoretical investigations continue to develop in close relation to practical, artistic work. Heinrich is affiliated with the research group RELATE (Research Laboratory for Art and Technology) at Aalborg University.

Felix Rebolledo Palazuelos

MA (S.I.P.) from Concordia University, Montreal, Canada. Lecturer in Screenwriting and Documentary Theory at UNIFRA in Santa Maria, RS Brazil. Researcher at InterArtec/CNPq and LabInter/UFSM, Brazil and member of the SenseLab (Montreal, Canada). He is a member of the editorial collective of *Inflexions Journal*. His research interests revolve around cinema: spectatorship, memory, identity and multi-media documentary production.

Felix Stalder

Ph.D., is professor for network theory at the University of the Arts in Zurich and lives in Vienna, Austria. He also works as an independent researcher/organizer with groups such as the Institute for New Cultural Technologies (t0) in Vienna. His main interest lies in exploring the interrelation of society, culture and technology, in particular in new forms of cultural production and spatial practice.

Fernanda Maria Oliveira Araujo

Graduated in Computer Science from Universidade Estadual Paulista Júlio de Mesquita Filho - UNESP (BRAZIL). Has experience in the area of Computer Science, with an emphasis on database. Currently conducts research in Arts: Brazilian folk art, museology, virtual museums, digitalization of collections and visualization. Student of Master in Education, Arts and Culture History - University Mackenzie. Researcher at Laboratory of Cinematic Arts and Visualization in the same University.

Flavia Caviezel

Ethnologist – Videast – Film Scientist Studies of Cultural Anthropology (specialisation in Visual Anthropology), Film and Constitutional Law at the Universities of Bern and Zurich/Switzerland. Video formation at the School of Art Berne.

Francisco Gerardo Toledo Ramirez

Francisco was born and raised in Mexico City and is now a Canadian citizen. His background is eclectic. He holds a BA in Visual Communication Design (Metropolitan Autonomous University) and an MFA in Visual Art (National Autonomous University of Mexico) both in Mexico City. He received his doctoral degree in Media Studies by The University of Western Ontario.

Frank Ekeberg

Frank Ekeberg (Norway) is an artist and researcher primarily concerned with the sonic arts. His work explores issues of ecology, time, space and memory. Using almost exclusively natural sound as source material, spatial aspects of the sounds and the listening environment are integrated as essential elements of the work. A composer by training, Ekeberg developed spatio-structural theory, a framework for identifying, analyzing and composing sonic space in acousmatic music.

Graham Wakefield

Graham Wakefield is a Visiting Professor in the Graduate School of Culture Technology at KAIST, South Korea. He holds a BA in Philosophy from the University of Warwick UK, a Master in Composition from

Goldsmiths College University of London, UK and a Ph.D in Media Arts & Technology from the University of California Santa Barbara, USA.

Gregory P. Garvey

Greg Garvey is Chair of the Department of Visual and Performing Arts and Director of the Program in Game Design and Development at Quinnipiac University in Hamden, Connecticut, USA. He is a frequent contributor at conferences and symposia such as ISEA and currently serves as a member of the ACM-SIGGRAPH Digital Arts Committee.

Gwenn-Aël Lynn

Gwenn-Aël Lynn studied Astronomy for a few years before finally deciding to become an artist. In the 1990's, after focusing on sculpture and installation, he shifted towards performance art. At the same time he began his inquiry into perception.

Hana Iverson

Hana Iverson is a media artist and informally, a systems integrator, with a focus on public art and networked communities. Her work emphasizes an embodied experience of place and activates social engagement via installation, mobile distribution and multimodal interaction. Recent projects include SonicCity, a city-scale sonic landscape designed for the city of Philadelphia.

Isabel de Cavadas Valverde

Isabel Valverde is a performer, interdisciplinary choreographer and researcher originally from Portugal. Ph.D. in Dance History and Theory from U.C. Riverside, supported by the Foundation for Science and Technology/PRAXIS XXI (Portugal), her dissertation is titled '*Interfacing Dance and Technology: a theoretical framework for performance in the digital domain*,' (publication forthcoming by FCG/FCT).

Isabel Restrepo

As an artist, Restrepo has explored multimedia narratives that deal with time, memory and social quests. Her research in 2002, *Espacios Vitales*, obtained the highest recognition in the School of Art and was awarded the third best thesis on a national level in the category of symbolic production by Universidad Nacional de Colombia.

Jackie Brookner

Jackie Brookner has been developing her ecological art practice for over 20 years. Her work brings plant-based water remediation for parks, rivers and wetlands together with habitat restoration, landscape sculpture and active community collaboration. These projects demonstrate how the undervalued resources of stormwater and other polluted water can be reclaimed to create evocative public places where people can connect with the natural systems that support our lives.

James Partaik

James Partaik is interested in a renewal of the language of art and is involved in a range of non-mainstream forms of contemporary art: site-specific physical computing, interactivity, installations, electronic art, performance and music. Partaik is a founding member of Avatar, an association for sound creation and dissemination at Quebec's Méduse

and is currently a Professor of Digital Arts at the Université du Québec à Chicoutimi.

Jan-Lewe Torpus

Jan Torpus is senior researcher and tutor at the Institute of Research in Art and Design at the Academy of Art and Design of the University of Applied Sciences and Arts Northwestern Switzerland (<http://www.fhnw.ch/hgk/idk>) and media artist (<http://torpus.com>). During the studies of interior design (Massana- Art and Design College, Barcelona, 1989-93) he intensively focussed on space, light and ambience in the contexts of interior and exhibition design.

Jane de Almeida

Interdisciplinary researcher Jane de Almeida works in the arts, film and new media fields, investigating the intersection among media, subjectivity and perception. As a Professor and researcher, she was Visiting Scholar in the Department of Philosophy at Boston College (1999), Visiting Fellow in the Department of Architecture and History of Art at Harvard University (2005), guest researcher at Media Lab Madrid (2006) and Visiting Scholar in the Dept. of Communication at University of California, San Diego (2007). She holds a Master degree and a Ph.D. in Communication and Semiotics from the Catholic University of Sao Paulo. Currently, she has been teaching at Mackenzie University in São Paulo, Brazil and at the Visual Arts Department at University of California, San Diego.

Janet Belotto

Janet Belotto is an artist from Toronto, who splits her time teaching in Dubai as an Associate Professor of Visual Art at Zayed University, UAE. Also a curator and writer, she develops projects that promote cultural exchange, with a current focus on photography and new media art in the MENASA region. Her work has been exhibited in a variety of collective, group and solo exhibitions internationally, including Beijing, Cairo, Dubai, Toronto, New York, Mexico City and Venice.

Je-ho Oh

Jeho Oh is a PH.D. candidate in the Graduate School of Culture Technology in KAIST and researches interactive artwork and performance in the Communication and Interaction Lab. He has written several papers on the subject of interactive artwork focusing on human-computer-interaction.

Jessica Thompson

Jessica is an Assistant Professor in Hybrid Practice in the Department of Fine Arts at the University of Waterloo. Her practice investigates spatial and social conditions within urban environments through interactive art-works situated at the intersection of sound, performance and mobile technologies.

Jonny Farrow

Jonny Farrow is an artist working with sound and objects at the intersection of sculpture, installation, radio, drawing, printmaking and performance. His work investigates cultural narratives through interventions created with objects –made or found – and sound – real or imagined. He holds

an MFA in Studio Art from the School of the Art Institute of Chicago and taught music, culture and sound art classes for several years in NYC.

Joonsung Yoon

Joonsung Yoon is Professor at Soongsil University, College of IT, the Global School of Media.

Josely Carvalho

Josely Carvalho born in São Paulo, Brazil, divides her studio between Rio de Janeiro and New York. In a career spanning approximately forty decades and a diversity of disciplines and mediums, ranging from painting, photography, printmaking, artist's books, video, sound and olfactory, she expresses through her artwork a deep concern of socio-political, environmental and women's issues. Josely Carvalho graduated from the School of Architecture, Washington University.

Karla Brunet

Karla Brunet is an artist and researcher, has a PhD in Audiovisual Communication (UPF – Barcelona, Spain), a Master degree in Fine Arts (Academy of Art University – San Francisco, USA), a Post-Bachelor in Electronic Art Critic (Mecad, Spain) and a degree in Communication (UFSM – Santa Maria, Brazil). She has participated on many photography and digital arts exhibitions in Brazil, Europe and the USA and got a grant from FAPESB for post-doctoral research on Mobile Technology and Art. Today, she is a Professor at IHAC (Instituto de Humanidades, Artes e Ciências) and Pós-Cultura at UFBA, where she researches projects that present intersection of art, science and technology. From 2009-2012, Karla was the coordinator of Labdebug.net, a media lab focusing on women and technology and in 2012, she was the curator of FACMIL/LabMAM. Karla coordinates the Ecoarte, an interdisciplinary research and art group.

Kate Hennessy

Kate Hennessy is an Assistant Professor specializing in Media Anthropology at Simon Fraser University's School of Interactive Arts and Technology (SIAT). As the director of the Making Culture Lab at SIAT, her research explores the role of digital technology in the documentation and safeguarding of cultural heritage and its representation and exhibition in new forms.

Ken Byers

Ken Byers is a multimedia digital artist from UK. His interests include art, science & technology, philosophy, human machine interaction, interactive media and embodiment. He has shown in both UK and internationally in USA, Russia, Eastern and Western Europe. He studied for an MA in Fine Art at University of Northumbria and later an MA in Media Production in experimental film at University of Sunderland. He is currently completing a PhD in 'Body-Movement Interactive Digital Audio/Visual Installations.' His current interests are in interactive installations, 3-D moving image, new media installations & sound art.

Kok Yoong Lim

Lim Kok Yoong is currently an Assistant Professor and a Phd student in the Media Art in Aesthetic Technology (MAAT) Lab in Global School of Media, Soongsil University, Seoul.

Laura Beloff

Laura Beloff (PhD) is an internationally acclaimed artist who has been actively producing works and exhibiting worldwide in museums, galleries and art events since the late 1980's.

Laura De Decker

Laura De Decker received her BA in Art and Art History (University of Toronto and Sheridan Institute), an MFA in Visual Arts (University of Victoria), post-graduate diploma in Interactive Multi-Media (Sheridan) and taught at Sheridan.

Laurent Mignonneau

Laurent Mignonneau is an internationally renowned media artist and researcher and pioneer of interactive art. He's a professor and Head of the Department for Interface Cultures at the University of Art and Design in Linz, Austria.

Luisa Paraguai

Luisa Paraguai is an artist, researcher and faculty member in the PhD and Master Design Program, Anhembi Morumbi University, Brazil. She studied Civil Engineering and Computing at University of São Paulo, Brazil. She received a master and doctoral degree at the Department of Multimedia, Institute of Arts, Unicamp, Brazil.

Majdi Faleh

Majdi is passionate about process in design, bringing a cultural touch to architecture and enhancing cross cultural exchange through design. Currently, Majdi has established an online freelancing design firm, called MWBM, from his home country Tunisia. He has also been an advocate of post-revolutionary design through writing and art.

Marea Atkinson

Adjunct Lecturer and Researcher at the School of Art, Architecture and Design, University of South Australia. Marea Atkinson main research area focuses in writing and artwork on light and darkness, the relationship between art and astronomy and the correlation between the terrestrial and celestial, Atkinson's has presented her research at numerous international events.

Mario Humberto Valencia Garcia

System engineer (Universidad Autónoma de Manizales). Specialist in university education (Universidad de Caldas). Specialist in video, digital technologies online/offline (UNESCO – MECAD/ ESDI – Universidad de Caldas). Master in Design and Interactive Creation (Universidad de Caldas). Mario worked as technical support engineer and researcher in the electroacoustic music laboratory Jackeline Nova.

Mark Hursty

Mark Hursty is a researcher at the International Institute for Research in Glass at the National Glass Centre of the University of Sunderland, UK. His project concerns the creative use of digital fabrication and press-moulded glass.

Masanori Mizuno

Masanori is a Lecturer at Konan Women's University. Member of Internet Reality Study Group Japan.

Matilda Asuzu

Matilda Asuzu is curious about cultural identities, how intercultural interactions morph them and the role of technology in these changes. She is hopeful about technology's capacity for social change and realistically aware of its limitations in the face of human nature. Asuzu explores the social dynamics of culture and garners inspiration from her experiences of weaving together the cultures of her West African parents and that of American society.

Matthew Riley

Matthew Riley is a PhD candidate at Swinburne University and lecturer at RMIT University. His work has been featured in international exhibitions and publications and he has spoken at events and venues including the Milia Conference (France), The London College of Communication (U.K.), NHK Broadcasting (Japan), xCoAx2014 (Portugal) and The Society for Animation Studies (Melbourne).

Miguel Carvalhais

Miguel Carvalhais is a designer and a musician. has a PhD on Art and Design from the University of Porto. He is an Assistant Professor in the Department of Design of the University of Porto and a researcher at ID+, chiefly focusing on interaction design and computational media and arts. He collaborates with Pedro Tudela in the @c project, developing works in musical and audiovisual composition, music for theater, sound performances and installations. In 2003 he helped to found the Crónica media label, that he has been running since.

Neal Swisher

Neal Swisher is a Doctoral Student in VCU's Media, Art & Text program. He studies philosophical theories of technology, identity and embodiment in digital media and art. He previously managed the cross-disciplinary Documentaries & the Law program at the University of Pennsylvania and worked on the digital humanities project 'Gibagadinamaagoom,' devoted to preserving the oral history and language of the Anishinaabe people.

Nigel Helyer

Nigel Helyer (a.k.a. Dr Sonique) is an independent sculptor and sound-artist. He is the director of a small multidisciplinary team Sonic Objects; Sonic Architecture which has forged an international reputation for large scale sound-sculpture installations, environmental public artworks, museum interactives and new media projects.

Nina Colosi

Nina Colosi, Founder and Creative Director of the Streaming Museum, is based in New York City.

Nina Leo

Nina Leo is a Canadian interdisciplinary artist. Her work examines how the contemporary media and technology-rich environment may affect us phenomenologically as experiences and interactions become ever more accessible yet divested of direct multi-sensorial richness. She explores how this otherwise redesigned intimacy may alter our interactions, influence our sense of self and shape our socio-political perceptions. Leo holds an MFA in Emerging Practices from the University at Buffalo and

has shown widely in Canada, the U.S and Mexico. She is represented in Toronto by the Red Head Gallery and is an Assistant Professor at OCAD University (CAN) where she teaches a range of intermedia studio-based courses and critical theory.

Olli Tapio Leino

Olli Tapio Leino is a new media scholar focusing on interactive art and computer games from the perspectives of critical ludology, philosophy of technology and existential phenomenology.

Oron Catts

Adjunct Lecturer and Researcher at the School of Art, Architecture and Design, University of South Australia.

Patrick Hutchings

Patrick Hutchings is a PhD candidate in the IT faculty of Monash University in Melbourne, Australia. He completed a B.Sci and a B.Mus with first class Honours at the Australian National University. Patrick has worked as a professional musician and composer while engaging in academic research in mathematics and environmental modelling. His current research is focused on generative algorithms for creating music.

Pedro Cardoso

Pedro Cardoso is a designer and researcher at ID+, Research Institute on Design, Media and Culture. He has a MA on Design and is currently a PhD student at the University of Porto pursuing studies in video games in the context of new media and interaction design and developing experimental work in this scope. He is currently a guest lecturer at the University of Porto, Portugal.

Peter Anders

Peter Anders, Ph.D. R.A: Peter Anders is an architect, educator and information design theorist. He has published widely on the architecture of cyberspace and is the author of 'Envisioning Cyberspace,' published by McGraw Hill, which presents design principles for on-line spatial environments. Anders received his degrees from the University of Michigan (B.S.1976) and Columbia University (M.A.1982) and the University of Plymouth Planetary Collegium (Ph.D. 2004).

Polina Dronyaeva

Polina studied Journalism in Moscow and Arts Management in London. She participated in a number of international arts events as a sound artist, curator and a researcher. Since 2008 she runs a laboratory Acoustic Images where she researches diverse aspects of human – machine interaction in the arts field.

Pramod Abichandi

Pramod Abichandani serves as the Director of the Second Year Engineering Curriculum at Drexel University. He is a Senior Researcher and an Assistant Teaching Professor at the College of Engineering at Drexel University. He received his Bachelors of Engineering (B.E.) degree in 2005 from Nirma Institute of Technology, Gujarat University, India and his M.S. and Ph.D. degrees in Electrical and Computer Engineering from Drexel University in 2007 and 2011 respectively.

Raivo Kelomees

Raivo Kelomees, PhD (art history), artist, critic and new media professor. Studied psychology, art history and design in Tartu University and the Academy of Arts in Tallinn. Professor of the New Media Department at the Estonian Academy of Arts. Book 'Surrealism' (Kunst Publishers, 1993) and an article collection 'Screen as a Membrane' (Tartu Art College proceedings, 2007). Doctoral thesis Postmateriality in Art. Indeterministic Art Practices and Non-Material Art' (2009).

Raphael Arar

Raphael Arar is an American artist whose work seeks to trace the trajectories of interpersonal and intrapersonal interaction in light of progress. These works manifest themselves in a variety of forms encompassing a synthesis of nostalgia and novelty often informed by scientific systems and humanistic research. His work has been shown at museums, conferences, festivals and galleries internationally. He lives and works in Los Angeles, California.

RM Vaughan

RM Vaughan is the author of nine books and several dozen short video works. He is the former art critic for The Globe and Mail (Canada's national newspaper) and a frequent contributor to cultural periodicals around the world. Vaughan's short narrative videos have played in festivals held in Chicago, Toronto, Uppsala, Oberhausen, Berlin, Copenhagen, New York, London and many other cities.

Sally-Jane Norman

Since 2010, as Professor of Performance Technologies at the University of Sussex, Sally-Jane Norman has led development of the Attenborough Centre for creative research while teaching and supervising post-graduates. From 2015 she will be co-investigator of the Sussex Humanities Lab. Her work spans art and technology and focuses on performance, scenography and sound.

Sarah Cook

Sarah is a curator of contemporary art, writer, new media art historian and Research Fellow at Duncan of Jordanstone College of Art and Design in Dundee, Scotland. She is the author (with Beryl Graham) of Rethinking Curating: Art After New Media (MIT Press, 2010) and co-editor (with Sara Diamond) of an anthology of texts about art and technology drawn from over a decade's research at the world-renowned Banff New Media Institute.

Sau Bin Yap

Yap was born in Kuala Lumpur and lives and works there now. He obtained a Bachelor of Arts in Fine Art degree from the Birmingham Institute of Art and Design, England in 1998. He is currently a specialist staff at the Faculty of Creative Multimedia, Multimedia University, Malaysia. Yap is also a founding member of Rumah Air Panas Art Society [RAP], an artist collective based in Kuala Lumpur.

Scott Hessels

Scott Hessels is an American filmmaker, sculptor and media artist based in Hong Kong who explores new relationships between the moving image

and the environment. He has released artworks in several different media including film, video, web, music, broadcast, print, kinetic sculpture and performance. His films have shown in international film festivals and on broadcast television networks.

Semi Ryu

Semi Ryu is a media artist who specializes in experimental 3D animations and virtual puppetry, based on Korean shamanism and oral traditions of storytelling. She is an Associate Professor in the Department of Kinetic Imaging at Virginia Commonwealth University.

Seth Thompson

Seth Thompson is an Associate Professor in the Department of Art and Design at the American University of Sharjah. He is a media artist and writer involved in documenting and interpreting art, design and culture through print and online presentations. His research interests and practice primarily focuses on the interpretation and representation of visual culture and heritage using panoramic imaging and hypermedia systems. Media art history with special emphasis on the panorama plays an integral role in this theoretical and practice-based investigation. Thompson holds a BFA in Studio Arts from the University of Colorado, an MA in Visual Arts Administration from New York University and an MFA in Visual Art from Vermont College. He is a member of the International Art Critics Association and has lived and worked in the United Arab Emirates since 2006.

Simone van Groenestijn

Media artist Cym is researching the relation between virtual reality and real life. Cym (Simone van Groenestijn), studied 'Interaction Design & Unstable Media' at the Rietveld Academy in Amsterdam. Currently she is doing a Master 'Education in Arts' at the Piet Zwart Institute in Rotterdam.

Slavica Ceperkovic

Slavica Ceperkovic is an artist and creative strategist who creates unique, user-focused, digital experiences and strategies across multiple platforms. Her strategic and tactical insight while defining industry-leading practices includes participatory research, foresight analysis and user-centred interaction design on emerging platforms.

Sojung Bahng

Sojung Bahng is a Masters student at the Culture Technology department in KAIST. She holds a BFA from the School of Film, TV & Multimedia at the Korea National University of Arts (Major in Broadcasting and Minor in Art Theory). Sojung has worked on diverse independent documentary and film projects as a director, producer and editor.

Steven Devleminck

Steven Devleminck is Director of the Transmedia post-graduate programme at the LUCA School of Arts, Brussels. He holds a Master's degree in science and PhD in philosophy.

Todd Cochrane

Todd Cochrane is a software developer in research and for art and a senior academic staff member in Digital Technologies, Business Support Services at the Nelson Marlborough Institute of Technology (NMIT), New

Zealand, in the software development and web technologies domain. He started his research computing career in 1995 as a programmer in a team that created the disease outbreak management software for the New Zealand government.

Tomás Laurenzo

Tomás Laurenzo is an artist, designer, researcher and engineer, born and based in Montevideo, Uruguay. He works as Associate Professor at the Computer Science Department of Universidad de la República (UDELAR) University, being the Director of the Engineering School's Media Lab. He holds a Master of Science, a Computer Engineer degree and a Bachelors in Computer Science degree. His Masters thesis has been considered a pioneering work in Uruguay. He is a PhD candidate, advised by Dr. Franco Robledo (UDELAR) and Dr. Alvaro Cassinelli (University of Tokyo). He has publications in the areas of art, HCI, Software Engineering and Mobile Robotics; his artworks and performances have been shown and awarded locally and internationally.

Tracey Gendron

Tracey Gendron, Assistant Professor, Department of Gerontology, has Masters of Science in Gerontology, a Master of Science in Psychology and a PhD in Developmental Psychology. She teaches the Biology and Physiology of Aging, Research Methods, Grant Writing and electives in the Gerontology Department. She is also an ASPIRE faculty fellow and a Service-Learning faculty fellow at VCU. Her research interests include the professional identity development and career commitment of Gerontologists, education through community engagement and service-learning, aging anxiety, ageism and gerontophobia, LGBT aging and staff knowledge and quality of care.

Wim van der Plas

Wim van der Plas is a sociologist interested in the definition of art and a propagandist of the complementarity of art and science. He was co-initiator of the first ISEA symposium (1988) and co-founder of the Inter-Society for the Electronic Arts (1990). He organised the first, second and seventh International Symposia on Electronic Art. He was director, subsequently board member of the Inter-Society for the Electronic Arts and its successor, ISEA International. Wim worked for several Dutch art schools and universities, among others in the fields of computer animation, media technology and the creative industries. Currently he is Treasurer of ISEA International, the coordinating body for the ISEA symposia and archivist for the ISEA Symposium Archives.

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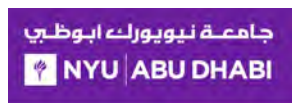
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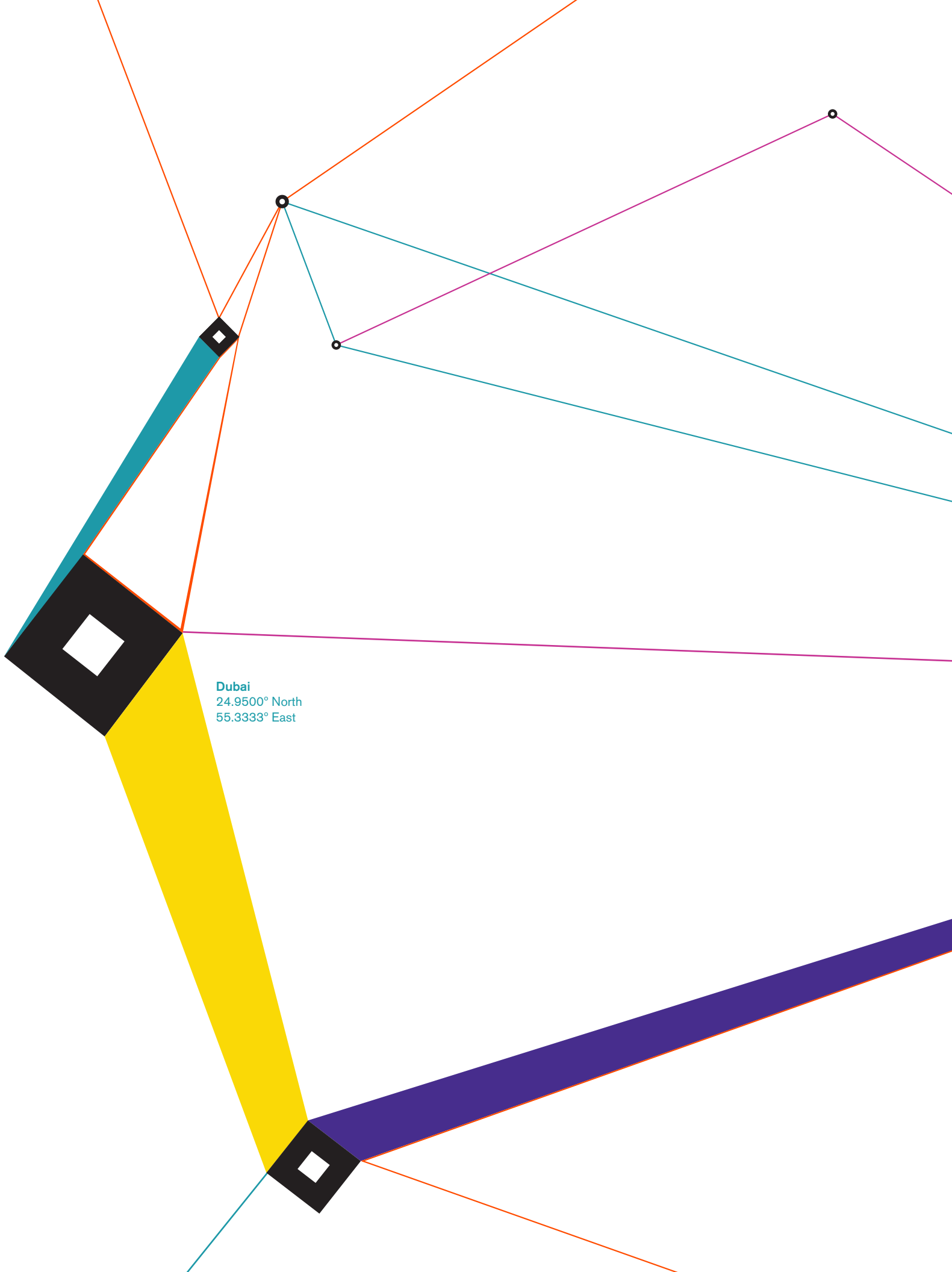


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