



fourth international symposium on electronic art

FISEA

the art factor:

Abstracts and Artist Statements

Minneapolis, Minnesota U.S.A.
November 3 - 7, 1993

FISEA fourth international symposium on electronic art

FISEA 93 is hosted by the Minneapolis College of Art and Design,
in affiliation with the Inter-Society for the Electronic Arts:

Minneapolis College of Art and Design
2501 Stevens Avenue South
Minneapolis, Minnesota 55404 U.S.A.
Telephone: (612) 874-3754
Email: fisea93@mcad.edu

ISEA
P.O. Box 8656, 3009 AR Rotterdam, Netherlands
Telephone: 31-10-2020850, 31-79-612930
Fax: 31-79-611737
Email: isea@mr.frg.eur.nl (Board) or isea@sara.nl

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Maria Stoll

FISEA 88, Utrecht, Netherlands / **SISEA 90**, Groningen, Netherlands / **TISEA 92**, Sydney, Australia / **FISEA 93**, Minneapolis, U.S.A. / **ISEA 94**, Helsinki, Finland / **ISEA 95**, Montreal, Canada

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ISAST International Society for the Arts, Sciences & Technology
ANAT Australian Network for Art and Technology
YLEM Artists Using Science and Technology

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** FISEA 93 presenter or plenary session officer*

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Sound Performance Events/Listening Chamber: Dr. Homer G. Lambrecht, Composer, MIDI Instrumentalist and Associate Professor, University of Wisconsin-River Falls / **Electronic Theater and Interactive Art Exhibits:** Dr. Scott A. Sayre, Manager of Interactive Media, Interactive Media Group, The Minneapolis Institute of Arts / **Gallery Installations/Exhibition:** Brian Szott, Gallery Director, Minneapolis College of Art and Design / **FAX Art Exhibits:** Craig Ede, Artist and Teacher / **Slide Show:** Judith Yourman, Artist and Assistant Professor, St. Olaf College

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credits

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Executive Director: Andrea Nasset, Interim Academic Dean, Minneapolis College of Art and Design / **Executive Assistant:** Joan F. Klaiber, Office of the President, Minneapolis College of Art and Design / **Minneapolis Community Liaison:** Phill Lindsay, Arts Economic Development / **Data Management:** Charles J. Swiszczy, Director of 3-D Shop, Minneapolis College of Art and Design / **Public Relations:** Anastasia S. Faunce, Public Relations Director, Minneapolis College of Art and Design

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FINE (P)ARTS

Alex Tylevich, Symposium Identity (poster and introductory animation) Rationale

"The Art Factor" is the focus of the symposium, with the merging of art and technology (the flesh/prosthesis - ir/rational dualism) as a key topic for dialogue.

The "unsure-of-its-identity" body becomes the center of attention in art. Technology used to enhance the body also determines to some degree what the body should be (an object? a piece of equipment? an artwork?). Enabled by science, the artist's territory is expanding to the medium of life itself (artificial intelligence, Wetware, virtual worlds). The body loses its definition, becoming a refractive medium through which science and art explore and question each other.

Anonymous, wired Christ-head immersed in fluid tissue — the human/machine hybrid "icon" — as the brutal reconciliation site.

"The Art Factor" may be interpreted as enhancing the technological interface with feeling, emotion, and other human qualities, and, at the same time, empowering artists with new technologies. An unknown territory lies where emotional machines meet the artist-cyborg. The language of the emerging culture needs yet to be defined, as the struggle to accommodate the machine continues.

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Roman Verostko, program director, FISEA 93

The focus at the 1993 ISEA has been THE ART FACTOR. From the beginning the program committee, recognizing that the clamor of new technologies too easily takes center stage, centered its interest on artistic procedures and information-processing by artists. The "Call for Participation" identified the need for more focused dialogue on the emerging artist/machine dialectic in terms of arts criticism. This new cultural frontier has been changing the way we experience and interact with our world. Clearly our "machine culture" will come to maturity by cultivating, celebrating and integrating "art," both intentionally and qualitatively.

The artistic work of the cyber culture manifests itself as a new edge preceding any art theory or criticism about itself. For this reason we see a need to draw those involved with this new edge into a more focused sharing and discussion about their "art," both in theory and in practice. So FISEA 93 has been orchestrated to foster dialogue on the "art factor," especially for those younger artists who have grown more with joy sticks than with paint brushes. The intention has been to promote a greater understanding of both the formal aspects of the work and its technology.

In keeping with our theme the "Call" explicitly invited work which the submitters considered to be "art," thus providing ground to discover "the art factor" through the window of submissions. The very process of hundreds of artists, theorists and scientists pondering the issues and preparing submissions would provide the substance for dialogue at this symposium.

Why must we address the critical language and the criteria we use for the "art" of this "machine culture"? Our relation to each other, the world and the things we make are being radically transformed as "ubiquitous computing" invades our lives. This radical transformation includes deep-level changes in how we create and talk about cybernetic art. From networks and form generators to genetic algorithms and computer viruses we see artists using technologies that challenge assumptions about the "hand" of the artist, original art, individual style and private expression. Shall we call "this" art? Where does it reside?

While the "modern" dogma has served its time well its critical language and assumptions pertain to a passing culture where cybernetics was the stuff of science fiction. The "modern movements," like fashion, were in a dialectic with their predecessors; "art on art," as it were. But those artists who have pioneered the stuff of cybernetics have come to us somewhat sideways, intensely involved with the interaction between humans and machines. The whole range — from networks to artificial life — has seduced many to total commitment. This includes a growing number who come directly out of the sciences crossing over to the world of art.

What draws them? How are we to assess their work? The artists' statements in this catalogue and the works they represent provide a ground for wrestling with these problems. This ISEA series has been evolving terminology and formal categories for reviewing and exhibiting art which has many labels and faces — cyber art, electronic art, computer art, digital media. Because of the interdisciplinary nature of the work the categories tend to blur and cross over each other.

So submissions have had to be passed around and pondered. Whose expertise pertains to this paper, to this work of art or to this project? How do we exhibit this? What kind of equipment will we need and how do we get it done? Is it feasible? Too often, it seemed to us, the limits of time, money and resources placed unwanted restrictions on our choices. Yet, even within the severe limits of the possible and the overlapping categories the shape of the exhibits and the symposium gradually emerged.

This catalogue documents the yield of the process outlined by the Program Committee nearly two years ago. Yet it is but a token of the exhibitions and papers, which in turn are both the fruit and the stimulus for those with a common interest coming together to share their visions, problems and aspirations. For many attendees at the first ISEA Symposium (Utrecht, 1988) — and subsequently — the discovery has been how many have traversed a similar path.

Always, the shape of these symposia is defined by the participants, not just those who present papers or exhibit, but by all who submit, and all who come and take part in the discussions, both public and private. Juries and committees make it possible to come together in a meaningful way, but it is those who come and participate who create the substance and meaning of the symposium as it unfolds, and lay ground for the next. So the process yields one ambiance in Sydney, another in Minneapolis, and we may expect yet another in Helsinki in 1994 and in Montreal in 1995.

Behind the scenes, thanks!

Behind the scenes in all of these symposia are those whose dedicated work makes all this possible. Most important of all has been Alice Wagstaff, my wife, who coordinated the Program Committee, assisted in implementing the screening of papers and panels, edited my writing, managed the Email and salved my wounds for the past year and a half. Her firm and unfailing support at the age of 74 will give many younger participants hope for the future!

We owe much to Lloyd Ultan, University of Minnesota, whose experience helped shape a meaningful "Call for Participation." Following serious surgery and months of uncertain health Lloyd has given generous counsel and support even as he recuperates.

All of us are indebted to the Chairs who shouldered the enormous task of screening the submissions with an eye to generating a diverse, representative and meaningful show of work in their respective areas. This includes especially Scott Sayre, the Interactive Media Group at The Minneapolis Institute of Arts, for his playful spirit and creative work on the Electronic Theater and the Interactive Art works; Homer Lambrecht, University of Wisconsin-River Falls, for magical patience with the physics of time and space as he worked out the Sound Performance Events; Brian Szott, Minneapolis College of Art and Design, for his sound advice and commitment to the Gallery Show; Bradford Smith, Minneapolis College of Art and Design, who treaded where angels feared as he assumed responsibility for equipment; Craig Ede who brought an energized spirit to curating the FAX Arts program; and Judith Yourman, St. Olaf College, who worked generously in curating the slide show.

On the administrative side the greatest credit must go to Joan Klaiber our Executive Assistant who, besides being assistant and right arm to the president of the Minneapolis College of Art and Design, managed the FISEA office, registration and the hundreds of related details. She has wrought marvels with limitations of resources and space. Andrea Nasset, Interim Academic Dean of the Minneapolis College of Art and Design and Chair of the FISEA Steering Committee, took on the big ones cheerfully and saved the day, time and again. Early in the planning stages I received important counsel from Susan Hanna-Bibus, Minneapolis College of Art and Design, who also has made a major contribution as Editor of FISEA publications. Thanks, too, to Beth Giles, Minneapolis College of Art and Design, who has coordinated the Workshops.

We are especially grateful to Wim van der Plas (Inter-Society for Electronic Art) who wisely and patiently guided us through this project, especially in its initial stages when things seemed so uncertain. Along with him we thank the many international advisors from over twenty countries who have helped us. We particularly note the contributions of Peter Beyls, Belgium; Yoshiyuki Abe, Japan; Artemis Moroni and Rejane Spitz, Brazil; Gary Warner, Ross Harley and Alessio Cavallaro, Australia.

We especially thank Roger Malina (*Leonardo*, ISAST) who recommended us to Wim van der Plas and has supported this and the other symposia from their beginnings. Thanks to him and Craig Harris (*Leonardo*) for their generous help and counsel.

Finally the one person, above all, who made this symposium possible has been John S. Slorp, President of the Minneapolis College of Art and Design, who has made College resources available as much as possible. His moral support, counsel and willingness to go the extra mile bolstered the ISEA series at a time when support for the series was waning.

For all these good people, including our many exhibitors, contributors and helpers, we say thank you for making FISEA 93 possible.

Roman Verostko, an artist and art historian, teaches world art history at the Minneapolis College of Art and Design. As a Bush Fellow he researched the "changing role of artists" at the Center for Advanced Visual Studies at MIT (1970). His seminal paper *Epigenetic Painting: Software as Genotype* (1988) identified biological analogues to autonomous form generating procedures. His "epigenetic art" includes a limited edition of George Boole's *Derivation of the Laws...* illustrated with his own "personal expert system." He received an Ars Electronica honorary citation this year and was included in *Genetic Art - Artificial Life* (Lintz, 1993). Other shows include: *FISEA* (Sidney, 1992), *Dada Data: Developing Media Since 1970* (Baltimore, 1991), *Interface: Art & Computer* (New York, 1991), *El Art* (Finland, 1991), *The Technological Imagination: Machines in the Garden of Art* (Minneapolis, 1989).

introduction

**ART/TECH COLLABORATIONS:
some tips on getting along**
essay by BRENDA LAUREL

Address: Interval Research, 1801 Page Mill Road, Building C, Palo Alto, CA 94304 U.S.A.
Telephone: (415) 354-0882; Fax: (415) 354-0872

You have to fall in love. Not necessarily with each other, although that helps — but with a vision of what you are trying to do together.

Mistress of brushes, catgut physicist, ballet biomechanic — every artist's practice involves rigor, knowledge, precision and curiosity. Painter of light, code composer, algorithmic alchemist — every technologist's practice involves beauty, harmony, intuition and protean transformations. We are more alike than we are different.

Somebody has to be on top. Like directing for theatre, the central task is creating the shared vision. Good guidance in visioning means getting people with vastly different skills to see pictures of the finished whole that converge as they work on it. First, agree on how it looks, tastes, feels. Then go away and apply individual expertise to describe how it is made. Come back and explain it to one another. Iterate.

Collaborative process and leadership are not mutually exclusive. Know when it is time to make a decision. Make it.

Bad communication will kill you — not listening to people with different expertise than yours, not bothering to translate your ideas into a common tongue, thinking you are a specialist, being secretive or territorial. The flipside: thinking it's not your business and holding your peace, avoiding conflict by avoiding communication, being afraid to ask stupid questions, waiting to express yourself until you're angry or alarmed.

The most important thing you will do together in the course of any project is to design tools. The technologist's tool seems indirect and arcane. What is he seeing when he uses it? The artist wants a capability that seems uncomfortably obscure. What kind of precision is she seeking?

Good tools will be there long after the piece is forgotten and the team is dissolved. They will influence the medium more strongly than any individual piece ever could. Good tools are the enduring fruit of successful collaborations.

THE PLACE IS ART
essay by JAN HOET

Director, Museum of Contemporary Art, Gent
President, International Association of Art Critics
Artistic Director, *Documenta IX*, Kassel, 1992
Address: Museum Van Hedendaagse Kunst Gent,
Citadelpark, B-9000 Gent, Belgium

For a long time I have been sometimes fascinated and involved, but more often annoyed by the use of electronic media in art. The annoyance was such a frequent experience and reached such heights that I tended to refuse to enter into discussions about the place of electronic media as a whole. Rather, I engaged individual artists. "The place is art," I said. The basic reference for me remained the one to painting and its disposition to extend beyond itself. In *Documenta* quite a few of the referential pieces were actually videoworks. Their attitude was one of enveloping the observer rather than encountering him.

A medium can only become a message when it is internalized. Every new area needs time to become familiar. In its first phase the power of the inherent possibilities is often overwhelming, and most of the people using it are adepts of the technology rather than artists for their own sake. At the same time there are the true pioneers, developing a sensible indication of the possibilities, intertwining the medium with their own subjectivity and intersubjectivity. The paradigms, then, often remain linked to another area, like the first ceramics to the calabash.

This period seems to be over for many of the areas of electronic possibilities, now legitimized areas in their own right. The glamour of the novelty is no longer the prime seductive adventure.

abstracts
papers
panels

APOSTOLOS
ASCOTT
BARILLEAUX
BEYLS
CLAUS
EVANS
GIGLIOTTI
GOLD
HALABY
HARRIS
HERMAN
LIPPE
MAXWELL
MIRANDA
MÖLLER
MUSGRAVE
NEUMARK
REAGAN
SCHWENDIGER
SEARCH
SETTLE
SHORTESS
SPITZ
WEINTRAUB
WHITECROSS
WILSON
WITTE

REDEFINING THE STATE OF THE ART

MARGO K. APOSTOLOS, Ph.D.

Choreographer and researcher

Address: School of Theatre, University of Southern California, Los Angeles, CA 90089-0791

Robot Choreography, a method of programming robots to dance, explores the aesthetic implications of robotic movement. This work, integrating human and robot performers on stage and in video, has met with a mixed reaction. Acceptance and anxiety issues raised by robots in our society now apply to the world of art, as the technology spills over into creative venues. Clearly, performers and audiences must be prepared and reeducated to fully comprehend and appreciate the value of technological innovations.

Robot Choreography provides an exemplary case of how computer and robot technology has expanded the role of the artist and the audience. Robot performances illustrate that a real robot (programmable, intelligent and dexterous machine) is able to communicate and express feelings to an audience. Industrial robots, programmed to capture graceful and humanlike gestures, are cast as dancers and actors in various performances. Seemingly, a machine comes to life on stage.

Integrating art and technology can provide a new look at the same world: art utilizes science and science recognizes art. As our world becomes integrated with new technology, the human response must grasp a reality beyond the novelty of mere illusion and imagination. The intention of merging the worlds of art and science is *not* to replace the artist but, based on skill and technique, create a new form of expression.

FROM APPEARANCE TO APPARITION: communications and consciousness in the cybersphere

ROY ASCOTT

Director, the Centre for Advanced Inquiry in the Interactive Arts (CAIIA), Newport School of Art and Design, Gwent College, Wales

Address: 64 Upper Cheltenham Place, Bristol, U.K. BS6 5HR

Telephone: 0272-550151; FAX: 01016128743732

Art in the cybersphere is emerging out of the fusion of communications and computers, virtual space and real space, nature and artificial life, which constitutes a new universe of space and time. This new network environment is extending our sensorium and providing new metaphysical dimensions to human consciousness and culture. Along the way, new modalities of knowledge and the means of their distribution are being tested and extended. Cyberspace cannot remain innocent, it is a matrix of human values, it carries a psychic charge. In the cyberculture, to construct art is to construct reality, the networks of cyberspace underpinning our desire to amplify human cooperation and interaction in the constructive process.

HOLOGRAPHY AND THE LANDSCAPE TRADITION

RENÉ PAUL BARILLEAUX

Director of Exhibitions and Collections/Chief Curator, Mississippi Museum of Art

Address: 201 East Pascagoula Street, Jackson, MS 39201 U.S.A.

Telephone: (601) 960-1515; Fax: (601) 960-1505

In painting, photography, installation and video, artists throughout history have turned to the landscape and nature-based imagery as their source of inspiration, the subject of their explorations and more recently, the material of their art itself. Now holography is another artistic medium being used to explore the connection between art and nature and as such poses interesting juxtapositions between technology-based art and nature.

The increasing visibility of this art, through exhibitions of the work of artists such as Rudie Berkhout, Setsuko Ishii, Dan Schweitzer, Martin Richardson, Betsy Connors, and collaborators Susan Gamble and Michael Wenyon, is a critical step in broadening the knowledge and appreciation of the work both in terms of the general public and the art world. Rather than approach this work as a complete break with what had come before, it is more accurate to acknowledge its connections to the past and see it as a new, distinct but evolutionary direction for the future.

CREATIVITY AND COMPUTATION. TRACING ATTITUDES AND MOTIVES.

PETER BEYLS

Head, Electronic Imaging Department, St. Lukas School of the Arts

Address: Paleizenstraat 70, B-1210 Brussels, Belgium

Email: peter@arti.vub.ac.be

Is there potential to emulate true creative thinking in a computer program, or are we limited to building machines that merely simulate human creative activity?

The study of the evolution of individual attitudes, personal motivation and critical interpretation of machine-based art brings us to the heart of the matter: how to build synthetic systems that exhibit aspects of true creativity. All this seems hard to expect from a machine. Yet, by studying the architecture of creative algorithms from an artificial intelligence point of view, and by analyzing both knowledge-based, interactive systems and behavior-inspired, creative autonomy in a cross-disciplinary approach, we may begin to shed some light on this complex and perplexing topic.

ART IN THE SOLAR AGE: the solart global network 1995

JÜRGEN CLAUS

Professor, Academy of Media Arts, Cologne, Germany

Address: Centre Overoth, Overoth 5, B-4837 Baelen, Belgium

Telephone: (32) 87 - 74 37 91 + 92; Fax: (32) 87 - 74 37 96

Adoration, celebration and practical use of the Sun was at the very center of many, nearly all, ancient civilizations. The quest for a Solar Age today is defined by changing ecological consciousness and the strong demand of the underprivileged three quarters of the world to participate in a higher quality of living. This quest cannot be based on traditional, non-renewable energies; we must turn to Solar Energy.

If the change toward a Solar Age is to stabilize our civilization, it must involve cultural change. Ecological stability relies on cultural change to be seriously anchored within the different societies of our Planet.

Art is part of the continuous critical, as well as creative, reflection of our life within the Biosphere. The Biosphere concept regards living matter in its entirety as the domain for the accumulation and transformation of the Sun's energy. Is art able to share this concept of all living matter?

The aim of *The Solart Global Network* 1995 is to bring artists together in working with outdoor solar artworks. These might be outdoor holograms, light works depending on direct use of solar power or reflection of Sun light. Highlights of this Solar Festival will be positioned on different parts of the Planet in July and August 1995.

The Solart Global Network 1995 is value-oriented. Network, in this context, means a networking of people who share the same vision of the Solar Age. Technology is used at the most advanced level but only to strengthen the underlying values of a critical and creative redefinition of art in the Biosphere.

THE IMPLICATE BEAUTY OF THE ALGORITHM

BRIAN EVANS

Vanderbilt University U.S.A.

Email: evans@ctrvax.vanderbilt.edu

In its pure form mathematics is often practiced with inquiry as its motivation and aesthetic discovery as its goal. Defining aesthetic experience is difficult. I consider an aesthetic experience a heightened moment when one finds resonance with the perceived, transcending sensation and emotion, and for some, moving towards the spiritual.

An aesthetic moment is not dependent on sensory information. It is cognitive, the mind interacting with perception. Cognition and perception are concerned with ideas, not external objects. Even as basic an experience as color is not dependent on sensory input. Anyone who dreams in color can attest to this. The experience is directly with thoughts, with ideas.

With the advent of technology it is possible to manifest mathematical objects as images, sounds, sculpture and even poetry. Artists in all media have found mathematics (most often described algorithmically) of value in their creative enterprise. Through algorithmic works we discover an inherent beauty and meaning in mathematics, perceived by the senses through objects defined in space or time, for example numbers mapped into color or pitch. Often the source of these works, the mathematical proof, the algorithm, has a beauty (elegance in mathematical parlance) that itself has aesthetic worth. Mathematical ideas can not only be a source for aesthetic construction, but can themselves catalyze aesthetic experience.

Ideas do not need representation in the external, physical world in order to be known. This premise is fundamental to creative activity. Mathematical ideas continue to contribute greatly to the creative endeavors of our civilization. Masterworks of this mathematic enterprise have survived through millennia not only as tools for science but as resonant ideas of aesthetic substance.

AESTHETICS OF A VIRTUAL WORLD

CAROL GIGLIOTTI, Ph.D

Education and Technology Liaison, The Wexner Center for the Arts, Ohio State University
Address: 340 Hopkins Hall, Ohio State University, Columbus, OH 43210 U.S.A.
Telephone: (614) 292-7183; Email: carol@cgrg.ohio-state.edu

The aesthetics of interactive technologies, such as virtual reality, multimedia and telecommunications, inherently involve tough choices for artists and commitment to accepting responsibility for their impact. These choices entail the ability to resist accepting the dehumanizing metaphors already in place. Instead, evolution of the aesthetics of interaction in these intermedia should recognize and challenge these metaphors.

In making aesthetic choices artists have assumed certain ideas about the purposes and values of art making. Those assumptions have changed over time and have come from various sources both internal and external to the art making process, but they have had primary impact on what was communicated by the art and about the art of any particular time.

With the emerging aesthetic of interactivity, artists face once more the need to recognize and reassess the integral connections between aesthetics and ethics. Various theories of dramatic interaction, such as Bertoldt Brecht's as well as contemporary moral theories which encourage the development of an ethic of care and responsibility for others, may prove helpful. Connections between aesthetics and ethics have had, and will continue to have, great impact on how technology defines and is defined by culture.

ART IN THE AGE OF UBIQUITOUS COMPUTING

RICH GOLD

Composer, cartoonist, artist; Researcher, Xerox Corporation, Palo Alto Research Center;
Director of the PARC Artist in Residence Program (PAIR)
Address: Xerox Corporation, 3333 Coyote Hill Road, Palo Alto, CA 94304 U.S.A.
Telephone: (415) 812-4825; Fax: (415) 812-4471; Email: richgold@parc.xerox.com

We are moving into a new technical age called "Ubiquitous Computing" in which there will be computers, sensors and actuators embedded everywhere and invisibly throughout the environment. The big bulky thing with glowing screen and the hundreds of buttons that sits clumsily on your desk, currently called a computer, will disappear. Instead, your desk, chair, door, pad of paper, house, car, white board, clarinet, crayons, refrigerator and tennis shoe will all be computers, and just as importantly, they will all be talking with each other.

This highly sensuous, reactive and gossip environment will certainly alter the way in which we work, play and think, and it will have an equally profound effect on the arts. Firstly, "Ubi-Comp" will give artists a new palette of techniques and materials with which to create works. Artists of any culture make their art from the "mud of their own riverbank" and we expect artists of the near future to be no different. Secondly, Ubi-Comp will provide the viewer with new ways of seeing and hearing these works, as well as interacting with them. And thirdly, Ubi-Comp will open a new area of artistic exploration, "Enspirited Reality," in which artists can determine the poetics of new objects based on the affordances and histories of each object. A coffee mug might scroll different stories around its surface depending on your preferences, time of day, who else is in the room and the current musings of your favorite author. Your critique could instantly bounce to other breakfast tables about the world. The author explores these and related issues of "Externalized Consciousness," using examples such as the Ubi-Pipe and the Ubi-Lunch-box.

TECHNOLOGY, ABSTRACTION AND KINETIC PAINTING

SAMIA A. HALABY

Unaffiliated artist; Work is included in many museum collections including the Guggenheim Museum in New York and the Chicago Art Institute Gallery. Video of computer work is in the video Library of the Museum of Modern Art in New York.
Address: 103 Franklin Street, New York, NY 10013 U.S.A.
Telephone: (212) 966-3517

New technologies bring new methods to abstract painting. Electronic methods intersect with visual form resulting in a renewal of content, appreciation and criticism. This expands the audience for art as it expands artistic productivity.

Computing provokes three methods in the author's painterly explorations:

1 Programming kinetic paintings with sound, in essence programs performed on a computer, provokes new concepts of the picture plane as monitor and about the sequencing in time of abstract elements. Furthermore, it leads us to "look at" forms not only for their visual attributes but also for their audible ones.

2 Painting software is combined with video to record painting sessions. Watching work from a long painting session compressed onto a video can teach the artist more than years of oil painting and criticism. This is accompanied by an artistic freedom because the expense and difficulty of mixing paints is removed.

3 Using interactive programming to automate the making of kinetic abstraction has provoked the analysis of how artists use nature and reality as a source from which to extract general principles that they use in art. Colors, atmospheres, textures, types of shapes, methods of addition or subtraction of shape, sequencing and rhythm, divisions of the picture's surface — all can be menu-driven to create pictorial art which does not require manual drawing skills.

CONFIGURING HOSPITABLE SPACE

CRAIG HARRIS

Artist
Address: 686 47th Avenue, San Francisco, CA 94121 U.S.A.
Telephone: (415) 750-0684; Email: craig@well.sf.ca.us

The Configurable Space project, a research project based on simulations of future artists' work environments, explores the creative process, and examines the tools and processes that form the foundation for technological resources designed to support creative activities. It is directed towards the development of a balanced understanding about how we use the visual, aural, tactile and configurable capabilities of digital technologies, and how the tools developed affect ways that we think, feel, formulate and develop on intellectual, spiritual and emotional planes.

Configurable Space environments incorporate any available technology that can be used to support the illusion that the implied resources already exist. The simulations incorporate representations of interactive computer display tables, walls and holographic images, within a multi-dimensional sound environment. This creates the context for exploring relevant issues and for imagining how the space might be used in actual circumstances. The author provides a retrospective look at this project.

DETERMINISTIC CHAOS, ITERATIVE MODELS, DYNAMICAL SYSTEMS AND THEIR APPLICATION IN ALGORITHMIC COMPOSITION

MARTIN HERMAN, Ph.D.

Composer; Educator, California State University at Long Beach
Address: Department of Music, California State University at Long Beach, 1250 Bellflower Boulevard, Long Beach, Ca 90808 U.S.A.
Telephone: (310) 985-5691; FAX: (310) 985-2490; Email: mherman@csulb.edu

There has been a growing interest in and an increasingly wide application of dynamical mathematical models in the domain of electronic music composition and synthesis. Iterative models and mathematical chaos algorithms provide for fertile creative ground among composers and researchers.

Employing his research on algorithmic composition involving the application of statistical methods that utilize "chaos" equations, the author has developed programs which use iterative models, non-linear mathematical feedback loops, to generate musical material. The programs have been implemented in MAX, an object-oriented graphic programming environment for computer music composition, on a Macintosh computer. With MAX the author can foray into the area of computer assisted, algorithmic composition; however, the composer's ear and musical judgement are not diminished in importance insofar as the final piece is concerned. To address this issue of human/machine interaction and its implications for computer assisted composition, the author displays the computer models with which one may interact in real time and which generate musical output in MIDI-based systems and plays examples from pieces which have developed from these models.

A USER'S GUIDE TO THE ELECTRONIC CLICHÉ DELLE MAXWELL and ANNETTE WEINTRAUB

Contact: Annette Weintraub, Professor, City College of New York
Address: Department of Art, City College of New York, 138th Street and Convent Avenue, New York, NY 10031 U.S.A.
Telephone: (212) 650-7410; Fax: (212) 650-7438; Email: anwcc@cunyvm.cuny.edu

Are you enticed by the infinite possibilities for image transformation using radically new tools? Do you describe your work in terms of pixel count or computer and software brand names? Is passive experience with outdated art forms no longer relevant to your work? Do you believe that by programming in pattern, meaning will necessarily follow? Do you think that anyone who agrees with George Bernard Shaw's statement that "Symmetry is the enemy of art" has clearly never appreciated the fine points of computer programming? Do you believe that Chaos theory combined with the powers of digital computers can explain everything from the movement of sub-atomic particles to the organization of human consciousness with pretty pictures to prove it? Have you tired yet of reading snide critical reviews about how the digital revolution is being led by art novices ignorant of the lessons of art history?

The critical language of electronic art and its emerging visual conventions have been distorted and debased by superficial visual formulas, visual and verbal clichés and formulaic representations. Many of these representations have become the signature of electronic media, aided by appropriation by commercial interests and wide dissemination through mass media. This has obscured and colored discourse on content and aesthetics in technological art, especially within the mainstream art world.

The authors provide an irreverent examination of the emerging language of the electronic cliché in forms from 2-D to telepresence, and with reference to cultural influences of sexuality and gender, science and politics.

CELLULAR AUTOMATA MUSIC COMPOSITION: a bio-logical inspiration EDUARDO RECK MIRANDA

Composer, electronic music expert, artificial intelligence and music researcher
Address: AI/Music Group, Faculty of Music & Department of AI, University of Edinburgh, Scotland, UK
Email: miranda@music.ed.ac.uk

Music has always been an interesting domain for the application of new scientific discoveries inviting composers to combine artistic creativity with scientific methods. Today it is becoming increasingly common for the composer to turn to the sciences to supplement his or her compositional model. On the other hand scientists also seem to show interest in the organizational principles found in music.

The motivation in promoting interdisciplinary activities between composers and scientists is twofold. On the one hand it is believed that scientific models carry an important component of human thought, namely formal abstraction, which can be very inspiring for music composition. On the other hand questions are raised such as: "What can be the justification for using science as a compositional tool?" or, "Which aspects of science are applicable to music and how it can be done?" Obviously there are no simple answers for these. Each artist should be able to make her or his own judgements. As far as these questions are concerned, the work introduced by the author is to be regarded only as a contribution for empirical experimentation.

The author has selected a class of mathematical models known as "cellular automata" (CA) to play the central role in this research due to the fact that they have been used to model a wide range of scientific phenomena. During the past three decades scientists have been investigating and developing CA. Although very simple they can provide models for a wide variety of complex phenomena in physics (eg. dynamic and chaotic systems), biology (eg. genetics) and chemistry (eg. chemical reactions and crystal growth).

The author introduces an experimental system for cellular automata music composition called CAMUS (for Cellular Automata MUSIC).

INTERACTIVE ARCHITECTURE CHRISTIAN MÖLLER

Address: Lersnerstrasse 13, 6000 Frankfurt/Main 1, Germany
Telephone: 069/59 43 75; Fax: 069/59 43 75

Through "Interaktive Architektur" the tactile becomes visible, the visible becomes audible, and the audible may become visible. The artist, playing with these phenomena, invites us to "hear" the shifting light or "see" environmental sounds. Installations such as the *Sound of Growing Grass* and *Surfaces of Variable Visibility* suggest the interesting range of interactive architectures available to artists through the use of electronics.

FORMAL LOGIC AND SELF EXPRESSION F. KENTON MUSGRAVE

Address: 44015 Falmouth Court, Ashburn, VA 22011
Telephone: (703) 729-5400; Email: musgrave@seas.gwu.edu

The thesis: self-expression in representational imagery may be obtained strictly through the access provided by the formal logic, and accomplishing this represents an event of significance to the history of the creative process. The formal logic is that of computer programs and scientific models of nature, couched as they are in mathematics. The artistic self-expression takes the form of renderings in which the artist is satisfied that an internal archetypal image has been reified, thereby providing a window into his/her soul. Using logic, math and science so directly in the inherently subjective practice of obtaining self-expression marks a peculiar and novel artistic process, one that entrains with it the formidable conceptual depth of those objective disciplines.

In this method, process and medium are neatly partitioned: "process" is the highly abstract task of formulating an appropriate formal system and deriving a suitable theorem in it, while "medium" concerns the physical manifestation of the visual interpretation of the theorem. The formal system consists of "rules of production" in the form of a mathematical model of Nature mapped into a computer program, and "axioms" — the input to that program. Using these instructions, the computer deterministically derives a theorem, which is an abstract "metarepresentation" of an image. The theorem consists of a large string of symbols. These symbols are interpreted as numbers; the numbers are in turn interpreted as colors; the series of point-values for colors as an image; the image as a representation of a possible aspect of Nature; and that rendering of Nature as a spiritual statement by the artist/scientist/mathematician/programmer.

The method is abstruse. The author attempts to describe various aspects of it and to illuminate some of the deep conceptual foundations involved, to the end of supporting the claim that its inception represents a significant event in the history of the creative process. The direct linkage of determinism, contraindicating free will as it does, with spirituality, at least provides an interesting philosophical juxtaposition.

INTERACTIVE JOURNEYS: making room to move in the cultural territories of interactivity NORIE NEUMARK

Address: 2/15 Baden Street, Coogee, Sydney 2034, Australia
Telephone: Australian Broadcasting Corporation (612) 333-1500

What happens when a theorist and radio/sound artist and a visual artist journey into the terrain of popular cultural and information interactives? The author examines these journeys in order to map a ground for criticism of interactives located at the crossroads of art, science and education practices and paradigms. It excavates cultural meanings underlying the dominant aesthetics in these interactives and asks what they do for their producers and users. Do the metallic bodies armour the user/producer for the fear(delight) of a machine world, producing the very fear (delight) in the process? Is morphing a body technique to evade(explore) the identity crisis precipitated by awareness of cultural difference? What desires produce and are produced by the gravity-less perspective and movement of 3-D animation? Are there tough chrome boy pixels and fluffy pretty girl pixels, marching in the repetitive parade of interactive bodies? And, "are all the pixels white"? Can art be available to new bodies/subjects and new bodies/subjects available to art through images resonating with cultural and aesthetic diversity?

The author explores both the challenges of the "art factor" for popular interactives and the possibilities to engage visual pleasures rather than bypass the sense/s and plug the "brain" directly into data bases or texts. Can we interact differently with young people whose diverse aesthetics, pleasures, consciousness and bodies have been colonized, metallized, normalized by a deadening repetition of dominant computer images and practices? The author's ongoing project with artist Maria Miranda is to create a "real" world familiar/strange enough to excite curiosity, pleasure and engagement by: painting a lush, non-"realist" world (neither predictably hard-edge sci-fi nor soft-edge fantasy), inhabited by culturally diverse bodies; animating a "real" world (domestic and exterior) expressively and fancifully; and infiltrating a popular cultural world with the critical, "inconsistent" edge of the "art factor."

SCIENTISTS DOING ART, ARTISTS DOING SCIENCE

TRUDY MYRRH REAGAN

Founder, YLEM: Artists Using Science and Technology
Address: 967 Moreno, Palo Alto, CA 94303 U.S.A.
Telephone: (415) 856-9593; Email: trudymyrrh@aol.com

Standing on that imaginary ridgetop where the fields of art lie on one hand and those of science and mathematics on the other, the observer first notices the number of scientists, mathematicians and computer scientists who cross the ridge and make contributions in the field of art.

These adventurers include both 20th century art pioneers who began in science-related fields before the age of electronic arts, and those who are using electronic means to bring their science-related expertise into the realm of fine arts. We are particularly indebted to Frank Malina, space scientist and artist, who gave voice to those whose work involves both art and science by starting the journal, *Leonardo*, in 1968.

But the traffic over the ridge is not one-way. The observer is struck as well by the number of artists who, in the course of their work, have been drawn over the ridge into the technical realm. They make contributions in both art and science using electronic tools; they do science with an artist's mind.

It is time to pay tribute to the scientists and artists whose careers have taken them to both sides of the ridgetop. These are towering figures who deserve explicit recognition.

URBAN SITES INFORM SCULPTURAL LIGHT WORKS

LENI SCHWENDINGER

Artist; Faculty, Parsons School of Design
Address: Light Projects Ltd., 448 West 37th Street, Loft 8g, New York, NY 10018 U.S.A.
Telephone: (212) 947-6282; Fax: (212) 947-6289

Leni Schwendinger's site-specific artwork with light, computers and industrial materials are temporal performances and permanent installations in the urban environment. As seen in two of her works, *Deep Time/Deep Space, A Subterranean Journey* (New Denver Airport 12/93) and *The Urban Heart, A Homebody?* (Tokyo 5/93), she addresses issues regarding content and subject matter in relation to site and technology. The work is interdisciplinary, drawing on cinema, music, theatre and architecture. "Interactivity" is redefined as the physical/intellectual engagement of the viewer.

Deep Time/Deep Space, A Subterranean Journey was commissioned by the City of Denver. This light and sculpture environment is installed in a mile-long shuttle-train tunnel. Arriving travelers perceive sculptural forms "animated" by the moving train. Materials include steel, reflective materials and lighting. Images informed by construction, mining, aerospace and subterranean fantasy worlds surround the train and segue into each other.

The Urban Heart, A Homebody? was performed in Tokyo using a biomorphically shaped concrete house as a canvas. The projection montage explored ideas about home, from the body as home to the heart, to the city as the intricate and pulsing center of contemporary life. Giant shadows cast by audience members were interwoven with projected paintings inspired by the human heart and symbols of Tokyo. Artist and audience created an ever changing visual landscape as the interaction of human figures revealed previously hidden images.

THE SEMIOTICS OF THE DIGITAL IMAGE

PATRICIA SEARCH

Artist/Assistant Professor
Address: Rensselaer Polytechnic Institute, Troy, New York 12180-3590 U.S.A.
Telephone: (518) 276-6470; Fax: (518) 276-4092; Email: search@rpi.edu

Current critical strategies such as Western formalism and postmodernist theory fail to provide an adequate framework for interpreting many forms of "digital" art. The author presents a perspective that differs from many other contemporary writings on the aesthetics of computer graphics — writings that highlight characteristics of the digital medium such as kinetics, interaction and networking, simulation and numerical analysis as evaluative criteria for defining the aesthetics of computer art. Using artwork from the 1950's to the present, it is shown how the semiotic structure of the digital image defines a new visual aesthetic in which symbols become interpretations of symbols and multiple levels of graphic encoding take on discursive characteristics similar to linguistic syntax. As this conceptual environment of symbols and text replaces tactile and kinesthetic interaction with the artwork, new forms of creative expression codify form, space, action and time into diverse levels of abstraction. The author examines the semiotics of the digital image within the context of philosophical developments in mathematics and science where causality and deterministic logic have been replaced by "descriptive" mathematics and scientific theories of relativity and quantum physics. These scientific methods place an emphasis on process and the relationships between cognitive and perceptual patterns that evolve from those processes — themes that are embedded in many forms of digital art.

LIVE INTERACTION APPLICATIONS FOR REAL-TIME FFT-BASED RESYNTHESIS

ZACK SETTEL and CORT LIPPE

Address: IRCAM, 31 rue St-Merri, Paris, 75004, France
Telephone: (33-1) 44.78.48.84; Fax: (33-1) 42.77.29.47
Email: settel@ircam.fr; or lippe@ircam.fr

The Fast Fourier Transform (FFT) is a powerful general purpose algorithm widely used in signal analysis. The FFT can be combined with the Inverse Fast Fourier Transform (IFFT) in order to resynthesize signals based on their analysis. This application of the FFT/IFFT is of particular interest in electroacoustic music because it allows for a high degree of control of a given signal's spectral information (timbre) allowing for flexible and efficient implementation of signal processing algorithms.

The authors present real-time musical applications using the IRCAM Signal Processing Workstation (ISPW) [Lindemann, et al, 1989] which make use of FFT-based resynthesis for timbral transformation in a compositional context. A user interface, developed by the authors in the MAX programming environment [Puckette, 1988], is used to demonstrate the subject. Examples include vocoders, cross-synthesis, dynamic spectrum shaping, frequency-domain spatialization. The focus is on these transformations and their control structures in terms of fine timbral control from a composer's point of view.

CREATIVE PROBLEM SOLVING AS AESTHETIC EXPERIENCE

GEORGE K. SHORTESS

Artist; Psychologist, Lehigh University
Address: Department of Psychology, 17 Memorial Drive East, Lehigh University, Bethlehem, PA 18015, U.S.A.
FAX: (215) 974-6467; Email: gks0@lehigh.edu

We can better appreciate computer-based interactive art by applying the results of theoretical and empirical studies of creative problem solving. This is illustrated by looking at examples of the author's interactive art works, which are themselves artistic and conceptual statements of perception and cognition.

While all art involves an interaction of the viewer with an object or an event, interactive art makes explicit this idea and requires the viewers to become behaviorally involved with the work. This is in contrast to the more detached contemplation often associated with the aesthetic experience. In the author's work, movements by the viewer activate photocells or other sensors which then, through a computer interface, change the sound or visual environment for the viewer. The environment is the art object, while the set of elements involved in the interaction is the art work.

In this context the viewer exercises creativity and problem solving, which become part of the art work itself. We can understand these psychological processes within the context of the theories of problem solving and creativity, using the author's work to illustrate. It is necessary to expand our understanding of the aesthetic experience to include problem solving behavior. And, electronic media have a special role to play in this expansion of the meaning of art.

QUALITATIVE, DIALECTICAL AND EXPERIENTIAL DOMAINS OF ELECTRONIC ART

REJANE SPITZ

Artist, researcher; Professor, Pontificia Universidade Católica-RJ/Departamento de Artes
Address: Rua Marques de São Vicente 225 - Rio de Janeiro - CEP 22453 Brazil
Telephone: (55-21) 529-9211; Fax: (55-21) 259-1893; Email: rejane@inf.puc-rio.br

The objective, quantitative and procedural characteristics of computer related languages contrast sharply with the expressive potential of human natural languages, which extend over aesthetic, metaphoric, artistic, affective and moral domains. Why can't these various dimensions co-exist, asks Streibel (1986)?

For a long time, artists' and technologists' views seemed worlds apart. In the words of Gregory (1980), "scientists fight error, while artists court illusion." The dilemma is not a new one. On the conflict between artistic and scientific approaches, Plato wrote, in his *Republic*: "the part of the soul that opines in contradiction of measurement could not be the same with that which confirms it."

Electronic Art is showing, however, that these complementary approaches can be combined: artists and technologists may blend their different perceptions and knowledge in order to enable the construction of a qualitative, dialectical and experiential electronic expressive language. In a world of social, cultural and economic disparities, maintaining a balance between uniqueness and uniformity needs to be the contemporary electronic artist's major struggle.

THE ELECTRONIC GARDEN

IAIN WHITECROSS

Artist

Address: 463 West Street, Apt. 623, New York, NY 10014 U.S.A.
Telephones: (212) 219-1097 Fax: (212) 989-1395

The Electronic Garden is a cybernetic sculptural environment created by the author and exhibited at the Hyde Collection in Glens Fall, New York in the winter of 1992-93. It is composed of nine freestanding "plants," each consisting of a cluster of "flowers" with the tallest being about human height. The *Garden* is activated by sound and spectators are encouraged to clap, sing, talk or even play a musical instrument.

The roots of this garden go back to the author's early contacts with Experiments in Art and Technology (EAT) in New York City, and his subsequent collaboration with an engineer, stimulating his interest in merging art and technology. Sociopolitical and artistic influences include the work of such historic figures as Hieronymus Bosch, Leonardo da Vinci, Claude Monet and Georgia O'Keefe. The philosophical significance of *The Electronic Garden* owes much to the writings of Arthur Koestler, Norbert Weiner and Carl von Linnaeus.

The *Garden* began as part of a youthful dream to employ technology for peaceful purposes. Over the years it has gained additional meanings. The *Garden* is a fragile image of the natural world in the cybernetic age, a natural world that we now know is also very fragile. In this sense, the *Garden* is a faint reminder of what we stand to lose unless we listen far more carefully to nature's feedback and improve our present wayward stewardship. But feedback alone — empirical and scientific — is not enough. We must also be aware of "feedforward" [Dudley Young] — intuitive and magical. The *Garden* is also, as are all gardens, a place where spirits come and go, where magic strikes and contact with the mythic is possible.

LIGHT AND DARK VISIONS: the relationship of cultural theory to art that uses emerging technologies

STEPHEN WILSON

Artist; Professor, San Francisco State University

Address: Art Department, San Francisco State University, San Francisco, CA 94132 U.S.A.
Telephone: (415) 338-2291; (415) 338-6537; Email: swilson@sfsu.sfca.edu

The impact of technology on contemporary life and culture is a vital issue in our age. Critical theory and cultural studies attempt to link the arts, literature, politics, sociology, anthropology, philosophy and technology in an interdisciplinary search for relevant concepts and frameworks with which to understand the current world. Art practice and theory are being radically reshaped by this activity.

This hybrid world of culture/art criticism, which places great import on the impact of emerging technologies, has seemed unexpectedly uninterested in the work of artists who work with these very technologies. Similarly, the discourse in the art/technology world — and in the technical world in general — has not engaged deeply the concepts from cultural studies. What reasons underlie this mutual lack of attention?

Critical theory and cultural studies offer compelling tools for understanding some aspects of contemporary technological society. However, while useful for understanding what exists, they are problematic for envisioning what might be. In this sense, they pose significant challenges for the artist. How should artists conceptualize their work? What sense can they make of the art world and its relationship to the larger culture? There are competing visions of how artists can most fruitfully work with emerging technologies: treat them as new media, deconstruct their cultural implications or participate in the process of invention and extension. Artists who work with emerging technologies are faced with the challenge of positioning themselves in these conflicting world views.

ART IMAGING WITH COLOR COPIERS: a survey of artworks from north america and europe

MARY STIEGLITZ WITTE, PhD.

Professor of Art, Boise State University

Address: Boise State University, 1910 University Drive, Boise, ID 83725 U.S.A.
Telephone: (208) 385-1053; Email: mwitte@claven.idbsu.edu

Artists began experimenting with photocopiers when the first commercial plain paper copier was introduced by Xerox in 1959. Interest increased with the availability of full color copiers. The early 1970's saw artists working on the 3M Color-in-Color System I and II, and the Color Xerox 6500. Early color copiers offered capabilities for creative printing, some manipulation of images and colors, and the transfer of images to other surfaces. They became a new tool for artists, photographers and designers. They provided direct, spontaneous image making with potential for new transformations. As color copier technology advanced, appropriation and artifice became issues.

The increased powers of the 1990's generation of color copiers provide opportunity for new directions in imaging. The switch from light-lens to digital laser scanning extended capabilities. Digital technology offers increased control, versatility and resolution. Laser scanners "read" the image, capture the image digit-by-digit and process the information by computer. The distinction between digital and analog representation is important. Digital information is easy to manipulate, recombine and transform. Appropriation is effortless. These copiers accept color negative or positive transparencies, prints or actual objects on the glass using the copier as a "camera." Some color copiers also interface with computer, video and CD-ROM imagery.

Artists approach color copiers with diversity, spontaneity, a sense of discovery, exploitation of the technology and elements of play. The opportunity for artist/machine interaction affords the potential for new combines of art and technology, and a fresh repertoire of forms, methods, communications and interpretations.

FISEA 93 Symposium Panels

THE COMPUTER AS A TOOL FOR SCULPTORS: sculpting in cyberspace

Rob Fisher, chair

288 North Allegheny Street, Bellefonte, PA 16823 U.S.A. Telephone: (814) 355-1458
Stewart Dickson

1105 Burtonwood Avenue, Thousand Oaks, CA 91360 U.S.A. Telephone: (213) 462-2300 ext.832

Timothy Duffield

1551 Johnny's Way, West Chester, PA 19382 U.S.A. Telephone: (215) 430-8557

Helaman Ferguson

10512 Pilla Terra Court, Laurel, MD 20723-5728 U.S.A. Telephone: (301) 776-0499

Bruce Hamilton

Route 1, Box 5-c, Glorieta, NM 87535-9701 U.S.A. Telephone: (505) 757-6603

Frank McGuire

1472 South Boulevard, Kent OH 44240 U.S.A. Telephone: (216) 678-6313

David Morris

35 York Street, Brooklyn, NY 11201 U.S.A. Telephone: (718) 797-1747

Steve Pevnick

2602 East Hampshire Street, Milwaukee, WI 53211 U.S.A. Telephone: (414) 961-8818

Sculptors today have the opportunity, if they choose, to explore human/machine interaction by employing new technologies in a "traditional" art form. This exploration accommodates a breadth of experience and approach, from Stewart Dickson's sculpture of mathematical surfaces to Timothy Duffield's fantastic landscapes; from Rob Fisher's crystalline spaceframe sculpture to Helaman Ferguson's direct carving celebrating mathematics; from Frank McGuire's sculpture derived from principles of genetic evolution to David Morris' "river crystal" fountains and cascades. In the work of these sculptors, the computer is both tool and inspiration. In the work of these artists, the boundaries between disciplines begin to dissolve.

COPING WITH HYPERCULTURE: technological change and the pace of cultural adaptation

Simon Penny, chair

Carnegie Mellon University, Fine Arts Department, 5000 Forbes Avenue, Pittsburgh, PA 15213 U.S.A. Telephone: (412) 268-2409

Peter Lunenfeld

1027 N. Orlando Avenue, Los Angeles, CA 90069 U.S.A. Telephone: (213) 650-6480

Lev Manovich

Department of Visual Arts, UMBC, Baltimore, MD 21228 U.S.A. Telephone: (410) 455-2150

Email: manovich@gl.umbc.edu

Jeffrey Schultz

3521 Hoyt Street, Brooklyn, NY 11231 U.S.A. Email: jeffschultz@aol.com

Accepting the premise that technology is a "black box," that any technological tool has no meaning until it is placed within a cultural system, there must exist cultural mechanisms by which new technologies are "naturalized" into culture. The exponentially accelerating speed of technological change leads us to question whether there is a maximum speed of cultural adaptation. Consider the paroxysms of confusion that copyright law is in due to the presence of new technologies. The mechanisms of cultural adaptation are slipping behind.

Despite the apocalyptic overtones, this is a very practical problem for artists in electronic media. Over the last twenty years we have seen short eras of technological art practice become technologically obsolete and slip from historical view. Thus artists, forced to upgrade technology continually, are caught in a cycle of unrequited technological consumption. In addition, the pace of technological change prevents a holistic consideration of the cultural context of the subject matter by the artist. And, the largely unacknowledged burden of artists who choose to explore new media is that they often find themselves in the R+D function of designing the technology, rather than simply aesthetically manipulating a traditional art technology.

Audiences as well as artists are affected by the rate of technological change. The codes and conventions required to "read the work" have not been culturally established. The unacknowledged burden on viewers of electronic work is that they must take care not to impose critical judgments germane to an older discipline (such as painting) upon a different technology. How do we cope?

THE NETWORK WITHOUT WALLS: the re-definition of art in an age of telecommunications

Greg Garvey, chair

1455 De Maisonneuve Blvd. West, Montreal, Quebec Canada H3G 1M8 Telephone: (514) 848-4629

Roy Ascott

64 Upper Cheltenham Place, Bristol, U.K. BS6 5HR Telephone: 0272-550151

Brenda Laurel

Interval Research, 1801 Page Mill Road, Building C, Palo Alto, CA 94304 U.S.A.

Telephone: (415) 354-0882

Carl Eugene Loeffler

Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213 U.S.A.

Telephone: (412) 268-2409

Over the last twenty years artists have been colonizing a range of technologies for the creation, dissemination and distribution of artwork in parallel to, and in spite of, the traditional means of exposure through the museum/gallery system. Telecommunication Art events represent a fundamental paradigm shift by redefining how artwork is created and shared, shoving aside the geography of territorial imperatives of art centers, overthrowing traditions of criticism, redefining the notion of avant-gardism, ignoring curatorial politics of exclusion, subverting the commodity status and questioning the mythology of the unique work of art. Today's artist with access to a computer and modem, fax or picture-phone can be part of the connectivity of the Virtual Global Village group show regardless of race, creed, color, sex, geographical location or time zone.

**THE ART FACTOR:
INTERNATIONAL EXHIBITION
OF ELECTRONIC ART
october 29 to december 16, 1993**

More than a year ago, planners for FISEA 93 aptly chose *The Art Factor* as the theme for this symposium. It is an appropriate theme because, for the first time, this event is being hosted by an art college – a place where new art forms are being discussed and can emerge. Moreover, it is appropriate because it is my belief that now is the time to emphasize the artistic over the technological aspect of this relatively young art form. Only if practitioners of electronic art have an understanding of both the history of art and contemporary aesthetics – with all its richness and diversity – will their art achieve its greatest potential as being the leading art form in the next century.

The Art Factor: International Exhibition of Electronic Art surveys the broad range of applications in electronic art today. While far from conclusive – large-scale installations and environmental pieces could not be included, for example – this exhibition establishes a solid foundation for the viewer. Like the technology in which it is based, computer generated art is sure to grow rapidly. Modern art has had a love/hate relationship with technology, at one moment embracing it as a panacea and the next rejecting it as a cause for all that is wrong in society. Nevertheless, the computer and its related technologies will take their place among the fundamental tools for making art.

More than 120 applications were received for this exhibition with 46 artists finally invited to participate. I'd like to thank the jurors Jim Dozier, independent curator and Judith Yourman, visual artist and Assistant Professor of Electronic Media, St. Olaf College, for their hard work in selecting this outstanding group of participants. Additional thanks go to Lisa Daehlin, gallery assistant; Anastasia Faunce, public relations; Bradford Smith, media center; Lars Mason, building services; and to the exhibition crew. Finally, I am grateful to the artists themselves for their cooperation and good humor throughout the entire process. My deepest gratitude goes to Roman Verostko for inviting me to participate in this project. It has been a rewarding experience indeed.

Brian Szott, chair, exhibition

Brian Szott is director of MCAD Gallery at the Minneapolis College of Art and Design. He received his Masters Degree in Museology with an emphasis in twentieth century painting and sculpture from the University of Minnesota, Minneapolis, MN. Exhibitions he has organized include *Picture This! Contemporary Childrens Book Illustrators from Minnesota*; *Chicagoland: Recent Work by Tom Arndt*; and *The Art Factor: International Exhibition of Electronic Art*. In addition to his duties as gallery director, Szott oversees the College's continuing studies program.

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| BREIGER | SEAMAN |
| BRILL | SHAPIRO |
| CASH | SHERMAN |
| CHMELEWSKI | SMITH |
| DALE | SUN |
| DAVIES | TONKIN |
| DAVISON | TRAUBE |
| DEHLINGER | TREMBLAY |
| DICKSON | TRUCKENBROD |
| DIMON | VICENTE |
| FARBER | WALKER |
| FENSTER | WEINTRAUB |
| FLAX | WILSON |
| FRAGA | ZAHALKA |
| GEORGE | |
| GLEESON | |
| HOLZER | |
| HUSOM | |
| KAC | |
| KRAUSE | |

the art factor
art exhibition

YOSHIYUKI ABE

Independent artist
Address: 3-20-27 Meguro, Meguro-ku, Tokyo 153, Japan
Fax: +81-3-3793-5953; Email: y.abe@ieee.org

The extended shading system of raytracing provides a look at new aspects of illuminated objects. Using numerous (30 to 500) light sources, I am creating the series, *Light=Shade*, which reveals images of light integration. In the algorithm, lighted regions can be easily transferred to shade and vice versa by parameter manipulation.

The potential of computer as an image generator meets my creative interest in the realization of images we can not see in the actual world.

VICTOR ACEVEDO

Independent artist
Address: 956 1/2 North Vista Street, Los Angeles, CA 90046 U.S.A.
Telephone: (213) 851-7594

Acevedo's work composites his own photography with 3-D computer generated models and digital painting. He utilizes a variety of software running on both the IBM and Macintosh. The final images are output via a film recorder as transparencies or as archival IRIS ink jet prints on Arches watercolor paper.

The computer, as a medium, is for the artist a kind of hybrid of painting and sculpture. Virtual objects can be built and moved as desired in a graphical three-space as well as expressively textured, lit or metamorphosed. The work has been described as a visual memoir of "everyday cymatic precessional resonance," that is to say, there is an intent to make visible the momentary crystallization of "localized psychic energy networks" which exist in non-parallel association with people and their environment. These networks are usually represented by the interweave or overlay of geometric abstraction such as non-cubical polyhedral nets or spherical planar arrays on late 20th century genre scenes.

AMY E. ARNTSON

Artist; Professor, Art Department Chairperson, University of Wisconsin-Whitewater
Address: Center of the Arts, University of Wisconsin-Whitewater, Whitewater, WI 53190 U.S.A.
Telephone: (414) 472-1324

As an artist, educator and communicator I am interested in mixed media, multi-disciplinary investigations using computer, photography and painting techniques. The computer has a non linear nature that can access, assimilate and manipulate visual data, scrambling notions of time and place. Combining old and new techniques with old and new visual images is a way of investigating the links between who we have been and who we are becoming. Nostalgia for a world of firmly fixed values mingles with curiosity and faith in newly emerging forms. *Ode to Yves* (Yves Tanguy) sets a computer manipulated duratrans image as a backlit screen for a surrealist space. This space is created inside a house/temple structure equipped with fresnel lenses for magnification.

PAUL BADGER

Independent artist
Address: 2626 Dawing Road, Columbus, OH 43202 U.S.A.

Badger's lithographs included in the FISEA 93 exhibition are from a series executed in 1993.

ROMEU BESSA

Artist, University of Illinois at Urbana-Champaign
Address: 1914-C Orchard Street, Urbana, IL 61801 U.S.A.
Telephone: (217) 337-0858

I am a painter. Although, since 1987 I have been imagemaking with computers as well. I use the computer as a medium in the same way that as a painter I use my brushes and my oil paints. I am fascinated by the similarities and by the differences between the two media, computer graphics and oil painting. I like to use the mouse knowing that the image on the screen is a "translation" of the movements of my hand. This "translation" is the result of digital codes being processed by a machine. Oil painting, by contrast, is the movement of the brush in my hand carrying the paint on the canvas. The investigation of this ontological difference is at the core of my work.

The visual complexity of my computer images is directly related to my painting. Whereas painting has its origin in the beginning of imagemaking (sometimes in caves), computer images point to a new kind of communication in a new kind of space. As the dark hole of the cave houses the visions of a particular age, so the black box of the computer stores the images of a new time. Cyberspace — a modern cave.

STEVE BRADLEY

Artist; Assistant Professor of Art, Electronic Imaging, College of New Rochelle
Address: 112 Warren Street, New Rochelle, NY 10801 U.S.A.
Telephone: (914) 235-0516, (914) 654-5205; Fax: (914) 654-5290
Email: cnrb3iona.bitnet@cunyvm.cuny.edu

I consider myself to be a trans-media artist or generalist. I convert systems of cultural iconography via media and technology into an analytical and satirical electronic narrative. I have been conditioned by the media culture so television (media) easily serves as my electronic landscape. The computer serves as the primary tool by which I link all my tools including sound, imaging and varied commercial software. By digitizing, manipulating and re-digitizing the electronic images of media, I am illustrating how "propaganda is to democracy what violence is to totalitarianism." Noam Chomsky's admonition to those who attempt to analyze the methods and messages of public control speaks to artists as well as political theorists:

"For those who stubbornly seek freedom, there can be no more urgent task than to come to understand the mechanisms and practices of indoctrination. These are easy to perceive in the totalitarian societies, much less so in the system of 'brain-washing under freedom' to which we are subjected and which all too often we serve as willing or unwitting instruments." (Chomsky, *The Manufacture of Consent*)

My own daily awareness of TV/print propaganda through image and script and what is not written or filmed is translated into art that speaks in the language of mass culture but offers "coverage" and interpretation that is erased or ignored in mainstream TV culture. My job is to share my outrage and sense of absurdity to effect some point of awareness in the vast network of cyberspace and wall space. By "naming" the codes of control, I seek empowerment for myself and therefore my community so we can stay awake in the midst of the media's pervasive anesthesia that numbs us to hear no evil, speak no evil and see no evil.

ELAINE BREIGER

Artist; Instructor, School of Visual Arts, New York City
Address: 112 Greene Street, New York, NY 10012 U.S.A.
Telephone: (212) 966-3004

With the Digital Arts 3-D modeling program, I create an object and then operationally — spinning, stretching, sliding — recreate it to view it in a changing perspective. Additional surface changes with texture maps, along with the almost unlimited palette to color light, allow this provocative, metamorphic process to continue.

Negatives are made to create photo etchings, and these respective images form the metal plates that are prepared for inking — a transfer of projected light to pigment — which culminates in a print made possible by a partnership among technologies.

BOB BRILL

Independent artist
Address: 7 Lois Court, Ann Arbor, MI 48103 U.S.A.

In an essay at the end of Lolita, Vladimir Nabokov writes, "For me a work of fiction exists only insofar as it affords me what I shall bluntly call 'aesthetic bliss.'" That phrase "aesthetic bliss" has stuck in my mind over the years, since it expresses precisely and entirely what matters for me in the visual arts. I am not interested in portraying social, political or moral themes, nor in exploring and expressing my inner psyche, nor in constructing academic exercises in form and color. This is not to deny for others the validity of such expressions. There's room in my world for every type of artist, as there is, alas, for every type of person. As for me, all I care about is beauty. I do not always succeed in invoking it, but my aim is to establish a momentary connection between the viewer's soul and the underlying order of the world. When that occurs it is usually signaled by a sudden intake of breath or a long pleasurable sigh. If you've had that experience, then you know what I mean by aesthetic bliss.

For several years now I have been exploring algorithmic art. For me this means creating images by writing computer programs that embody mathematical formulas or other orderly procedures. My pursuit of beauty has led me along this path, for mathematics, more than any other human activity, seems to offer connections to the cryptic universal order I am striving to express.