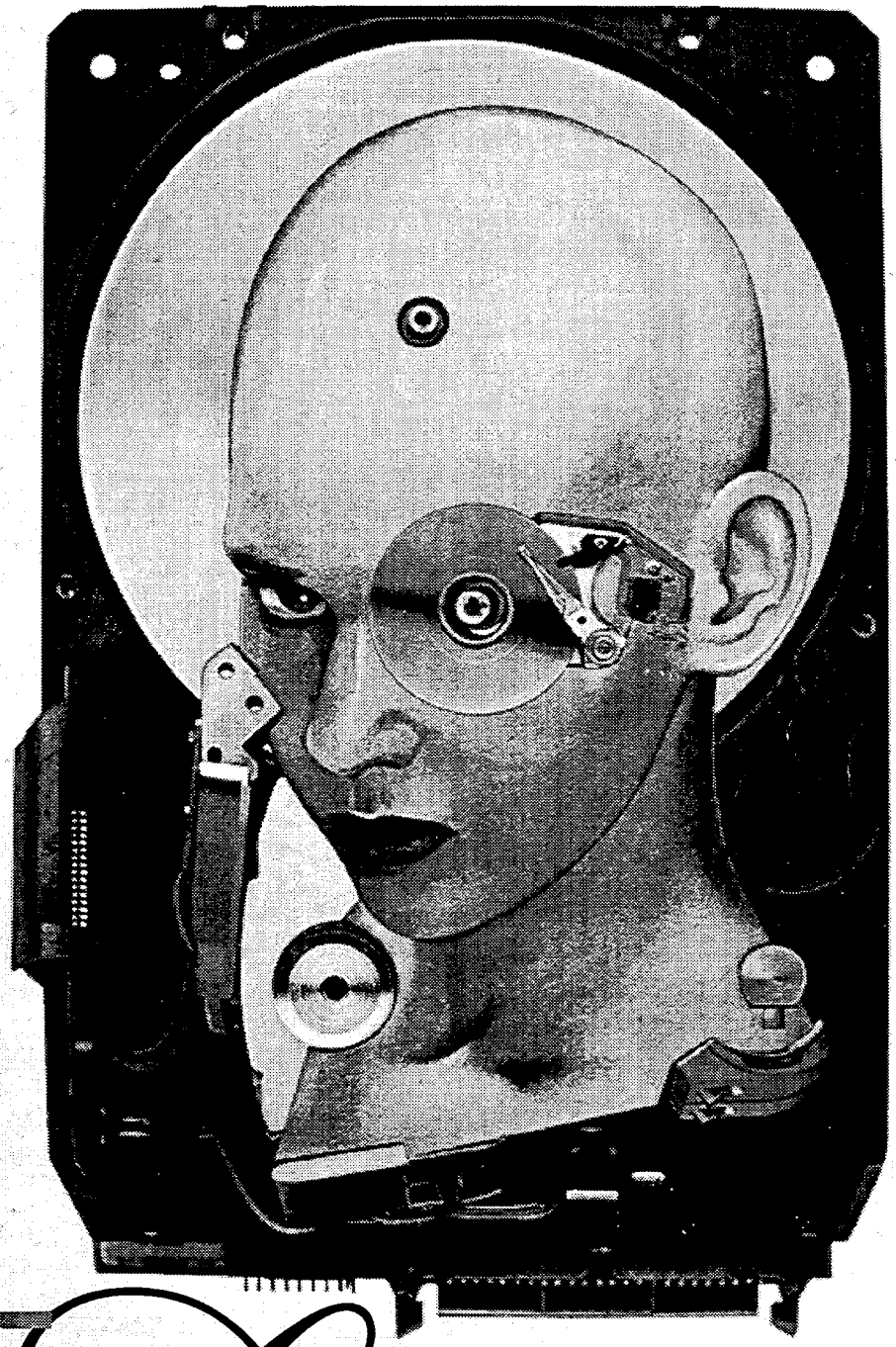

'95 SCan

Digital Passion

The 15th Annual Symposium on
Small Computers in the Arts
November 3rd-5th, 1994
The Franklin Institute Science Museum
Philadelphia, Pennsylvania

SCAN

Symposium:

Dick Moberg, President
Mark Scott, Vice President
Misako Scott, Symposium Coordinator
Rick De Coyte, Proceedings Editor
Rick De Coyte, Tom Porett, Gretchen Trainor & Tim Duffield,
Art Exhibition Curators
Brian Souder, Steve Berkowitz & Chuck Lutz,
Music Program & Performance Coordinators

Technical Staff:

Steve Beuret, Dick Moberg, Tom Porett, Brian Souder, Chuck Lutz, Steve Berkowitz, Mark Scott, Ken Kramar, Ranjit Bhatnagar, Mike Maier and Keith Robertson.

SCAN Board of Directors:

Dick Moberg, Moberg Medical, Ambler, PA
Tom Porett, University of the Arts, Philadelphia, PA
Steve Beuret, Videosmith, Philadelphia, PA
Rick De coyte, Silicon Gallery, Philadelphia, PA
Rebecca Mercuri, Notable Software, Philadelphia, PA
Steve Berkowitz, Tyler School of Art, Philadelphia, PA

SCAN Steering Committee:

Dick Moberg
Tom Porett
Mark Scott
Steve Beuret
Rick De Coyte
Rebecca Mercuri
Brian Souder
Steve Berkowitz
Ranjit Bhatnagar
Chuck Lutz
Nora Muñoz
Howard Byer
Sharon Heesh

THE SMALL COMPUTERS IN THE ARTS NETWORK

Presents

The15th Annual Symposium on Small Computers in the Arts

The Franklin Institute Science Museum
November 3rd - 5th, 1995 Philadelphia, PA

The small computer revolution is over. Many of the ideals and goals we have fought for years to promote are currently the status quo. After more than a decade of what has often felt like pitched battle with every traditional and commercial media, we can seriously assess and meaningfully exploit the digital domains that have been made accessible to all.

We've proven that Art is made regardless of the dominant medium of expression. The complexity of the skill-sets involved in the production of a work do not validate a work as art The reverse is also true: limitations of image and/or color resolution, speed and storage space cannot discredit meaningful work.

Now we can demonstrate previously impossible synergies between artistic disciplines based on mass digital storage and related user-interfaces for the production and use of 2D, 3D, time-based, and audio artwork. Old-style, analog film/tape/paper communications infra-structures metamorphose by means of CD-ROM and Internet into systems that promote the capability of anyone getting anything anywhere. Computer literacy has become an entry-level skill. The world is smaller, the pace is faster, where only knowledge and experience are worth real gold.

But what about multi-cultural art, western art traditions and the life experiences of present-day artists. Isn't it from these sources (and not from the pages of the weekly trade journals or latest user's manual) that we will gain the perceptions of life and art to fuel the fantastic work that will be possible as the industry matures?

The15th Annual Symposium on Small Computers in the Arts

is Sponsored by:

The Small Computers in the Arts Network
and
The Franklin Institute Science Museum

With Very Special Thanks to:

Ed Wagner & the Franklin Institute Staff
Rick De Coyte and Michal Smith at the Silicon Gallery
Tom Porett
Nora Muñoz
Mike Mosher
Charles Ostman
Dock Street Brewing Company

Cover:
Esther: Bionic Punk

The original will be on display at Silicon Gallery during Scan '95

Welcome to Philadelphia, and SCAN '95!

The Franklin Institute Science Museum

20th Street & Benjamin Franklin Parkway
Philadelphia, PA 19103
215- 448-1200
email: webteam@sln.fi.edu
http://sln.fi.edu

What's at the
FRANKLIN INSTITUTE?

The Dinosaurs of Jurassic Park

Come see the smashed-up Ford Explorer, the giant amber chunk, and the dinosaur stars themselves. Out-stare a Dilophosaurus - watch out, they spit, and don't let the 40 foot T-rex see you sweat. Then check out the real mummified dinosaur skin and insects trapped in amber. Go ahead, tease that Velociraptor, I'm right behind you.

The Fels Planetarium

The Other Side of the Universe

From the Hubble Telescope to the Planetarium's dome come dramatic new views of outer space. Features Black Holes and colliding galaxies. Narrated by Avery Brooks.

The Sky Tonight

This live presentation highlights the new star patterns that come into view with the change of seasons. The magic of DIGISTAR and special effects bring the constellations and planets to life.

The (4 story) Tuttleman Omniverse Theater

Africa: the Serengeti

Wildebeests as far as the eye can see and a heart-pounding chorus of hooves introduce a spectacle that few humans have witnessed, the annual Great Migration. See lions, leopards, cheetahs and hyenas in hot pursuit of prey.

The Musser Choices Forum

Dinosaur Special Effects

Explore the role of computers and other electronic devices in creating dinosaur special effects in movies such as Jurassic Park. Dinosaur sights and sounds fill the Musser Choices Forum for this interactive program.

First Friday's in Old City

The most entertaining way to see 35 galleries and showrooms of Fine Art, Antiques, Furniture, and the Decorative Arts.
City Paper said,
"First Fridays in Old City is the best way to show off Philadelphia"
and was voted one of the
"things about Philly you couldn't live without."

'95 Can

Local Restaurants:

Ben's
Downstairs at the Franklin Institute
Homemade soups & sandwiches, moderate prices

Milky Way Café & Scoops & Slices
Downstairs in the Atrium at the Franklin Institute

Dock Street Restaurant & Brewery 496 0413
2 Logan Square, between 18th & Cherry Streets
Good freshly brewed beer, innovative menu, med. prices

Cutter's Grand Café 851 6262
2005 Market Street
Very fresh seafood, well stocked bar, medium prices

Mace's Crossing 564 5203
1714 Cherry Street, (17th & Parkway)
Tavern with good burgers, medium prices

Morton's of Chicago 557 0724
Big, wonderful steaks, lobsters, lamb chops, tabs

Swann Lounge & Café 963 1500
Elegant lounge, creative menu, expensive

TGI Friday's 665 8443
18th & Parkway
Friday's is Friday's

Bistro Bix 925 5336
12th and Sanson
A little further afield but good food, medium prices

Pete's Famous Pizza
20th & Cherry Sts.
Self-explanatory

Little John's
20th & Race
Pizzas, Steaks (sandwiches) and Hoagies

Wagon Train Deli
Race Street, between 20th & 21st

Cherry Street Bar
21st & Cherry Streets

The Fountain at the Four Seasons Hotel 963 1500
Logan Square, between 18th & the Parkway
Fancy Food, fancy desserts, fancy prices

Mirabella's 981 5555
17th & Parkway
Good, updated Italian, reasonably priced

Rose Tattoo Café 569 8939
19th & Callowhill Street
Good international food, moderate prices, cute place

Brigid's
24th & Meredith

Bistro St. Tropez
24th & Market, The Marketplace

Cabs are everywhere, but just in case:

Old City Cab 338 0838 - Quaker City Cab 728 8000 - Yellow Cab 829 4222

Part I - Program

Friday

8:30 - 6:00 Presentations
7:00 - 8:00 First Friday - SCAN Art Show Opening

Saturday

8:30 - 6:00 Presentations
7:30 - 11:00 Performances

Sunday

8:30 - 5:00 Presentations

Part II SCAN Computer Art Exhibition

Part III Papers

Friday, November 3rd

8:30 - 9:30

REGISTRATION

9:30 - 9:45

OPENING REMARKS - Dick Moberg

9:45 - 10:30

THAT'S EDUTAINMENT! - Bill Kolomyjec

(This presentation includes the College Reel from TOY STORY).

Edutainment is something fun and educational. In this paper I share my experience of seeking to understand Edutainment with the reader. I reveal the modern method of obtaining a theoretical foundation and obtaining research material. I talk about how extending the content of a feature film into related media increases profitability and varies the experience. I talk about promoting critical thinking. I explain the concept of leveling an activity based on understanding child development, and give an example as to how this might be accomplished. I conclude by presenting some thoughts on evaluating Edutainment.

Dr Bill Kolomyjec: Pixar recently evolved from a world class computer graphics technology company to a digital animation studio. Dr. Bill is currently PIXAR's Education Specialist contributing to the CD titles publishing effort. He has an aggregate 14 years of teaching at the post secondary level. He has a Ph.D in Education, M.F.A in Graphic Design, and B.F.A. in Industrial Design.

10:30 - 11:15

SMALL COMPUTERS AND THE SCULPTOR - Kevin Gallup

Being a viable artist is difficult enough, but a sculptor generally needs more of the usual requirements; materials, space, tools, and supplies. In the past few years, the computer has become a powerful tool that not long ago cost more than most could afford, let alone the learning curve associated with becoming proficient with the system. Kevin will show how it all works for him.

Kevin Gallup: Currently adjunct faculty at Old Dominion University, Kevin recently set up a ceramic shell bronze casting foundry at ODU, and is exploring new techniques in casting, especially with CAD & 3D Digitizing.

11:15 - 12:00

REAL WORLD MULTIMEDIA SEALWORKS - Nick Floro & Chris Dwyer

See the latest hardware & software for creating exciting and informative interactive applications for education, presentations, training, kiosks, and entertainment. Nick will discuss hardware & software requirements, how to get started, cross-platform development, and recent technological breakthroughs. He'll demonstrate the creation of a multimedia application with products such as Apple's PowerMac, Radius video Vision Studio, Adobe Premier, Macromedia Director, Fractal Painter, Specular Infini-D, and present a variety of multimedia titles already in use in the real world. He'll also discuss how to create a "home page" with multimedia elements using Netscape, The Internet & the World Wide Web. Chris will be around for the rest of the day for one-on-one consulting.

12:00 - 1:00 LUNCH

1:00 - 1:45

Gerald Marks

Jerry will show his 3D video work and his internet type 3D images, each with its own 3D glasses which he will provide. He'll also show how he's creating an animated glass block mural for a subway station in New York.

Artist Gerald Marks was creating his 3D images, 3D museum installations and 3D videos long before mere mortals (like himself) had access to computers. He began his own digital transition in 1986. Best known for his 3D music videos for the Rolling Stones, he is currently installing an animated, computer generated 3D mural into 288 glass blocks in NYC's 28th St. Subway Station.

1:45 - 2:30

TOOL OR MEDIUM? - Judy Andraka
THE USE OF COMPUTERS IN PRINTMAKING

An overall view of printmaking and its evolution into the use of computers by some printmaking artists, and an in-depth survey of work from several of today's artists.

Judith Oak Andraka: Art Department Chair at Prince George's Community College, Largo, MD., founder of Mezzanine Multiples, a printmaking studio. Look for her work at the Silicon Gallery!

2:30 - 3.00

WILD HORSES - Rachel Gellman

3:00 - 3:30

TRANSFER - DON'T TRANSMORGRIFY: COPING WITH THE TECHNICALITIES OF VARIOUS MEDIA - Steve Beuret & Rick De Coyte

An overview of many issues that arise when moving images from one medium to another. Tips on how best to transfer between your computer, print, video, film, CD ROM, the Web, and other species of computer, and (perhaps) more. Why do these media do things differently, (cows have a very good reason for having five stomachs). Arcane knowlege from practitioners of the art, will help you avoid turning gold into lead.

3:30 - 4.00

THE VIRTUAL PALLADIUM - Robert Martin

Robert will show how a gallery at the Detroit Institute of Arts was transformed into an interactive performance art space for anyone who entered. He chose to work with interactive abstract improvised video and interactive improvised music for the intent of enhancing my goal and effort to empower the viewer and artist to become a participant in the creative process of art making in a world that is still being influenced by the words of Marshall McLuhan.

Robert Martin is an Independent Artist and an Associate Professor at Wayne State University in the Department of Art and Art History, Detroit, MI.

Walt & Cast ~ Boyd & Christen

4:00 - 4:45

OVERVIEW TO DESKTOP 4-COLOR PUBLISHING - Richard Wright

The volume publishing of process-color magazines and books is an involved art, require a state-of the-art Mac or PC linked to high-precision digital imagesetters. Richard will discuss modern solutions for printing successfully with a wide range of printing presses, materials and inks.

4:45 - 5:30

CYBER ART:
AN INTERNET BASED ELECTRONIC MEDIA CURRICULUM - Kevin Daniel

An overview of a World Wide Web based course, a demonstration of some of the resources used, and examples of student work.

OPTIONS FOR MULTIMEDIA PUBLISHING:
THE COMBINED USE OF THE INTERNET AND CD-ROM FOR DISTRIBUTING HYPERMEDIA DOCUMENTS
Kevin Daniel, Brian Slawson

A demonstration of a WWW based HTML document which uses a companion CD-ROM to deliver high-band width information such as video.

Kevin Daniel produces computer-controlled kinetic sculpture, and is currently heading the Electronic Intermedia program at the University of Florida.
Brian Slawson, MFA University of Michigan

5:30 - 8-ish

SUPPERTIME

may we suggest a few of our favorite eateries in the FIRST FRIDAY GALLERY SECTION of Old City:

8-ish - 10:30 . . . ish

SCAN '95 ART EXHIBITION OPENING & FIRST FRIDAY!

SCAN helps to celebrate SILICON GALLERY's first anniversary as one of the few in the region to showcase computer art. SCAN attendees will be treated to First Friday, an event in which all of the galleries in this "gallery rowÓ" open their shows concurrently creating an incredible block party!

&

while you're there, be sure to catch

NohTV - Walter Wright, Boyd Nutting and Samia Halaby,

Boyd Nutting on Keyboard and Electronics, Walter Wright on the Sampler, and Samia Halaby with her interactive Computer Graphics Program will perform at the Quarry Street Caf (across the street from Silicon Gallery) during the First Friday festivities!

Saturday, November 4th

9:00 - 10.00

VIRTUS - Alan Scott

Virtus WalkThrough Pro, a powerful and intuitive 3D world building program features VRML export for publishing 3D sites on the World Wide Web, and support for 3D stereo viewing, collision detection and robust modeling and editing tools. Use perspective-correct texture mapping to add realistic surface details such as doors and windows, bricks & tile, landscapes, even corporate logos. Import a Quicktime movie (Macs) to enliven 3D multimedia presentations. You'll envision, create, and explore any idea in 3D without leaving your desktop computer and then publish your creation on the Internet.

Alan Scott: Online Product Manager Emeritus, VIRTUS WORKS

10:00 - 10:45

ALMANAC OF DISASTERS - Cati Laporte

This almanac is a progressive, living collection of disasters. When all the days of a year are documented, it becomes a clickable atlas. This project is intended to be an exhaustive documentation of disasters in the 20th century, and its site on the WWW has been in ongoing construction since January, 1985.

Cati Laporte is always pointing out the insanity of humanity. Last year, this Manhattan artist (aka FIRE) explained why she made and sold outlaw postage stamps featuring Dr. Kevorkian, Lorena Bobbitt and Ford Bronco & DNA to name just a few. This year, we'll tour some of the decade's notable disasters.

10:45 - 11:30

QUANTITATIVE ART HISTORY - Judson Rosebush

Once art works are digitized they may be subject to a wide variety of analytical methods. This presentation advances the case for a quantitative art history and suggests how researchers and historians may use existing tools and methods to make profound analysis.

11:30 - 12.00

SPIDER WOMAN ON THE WORLD WIDE WEB? ALTERNATIVE VISIONS OF WOMEN IN CYBERSPACE - Susan Ressler

This paper is concerned with a cultural critique of gender role stereotypes in cyberspace. Susan will present images of cybered bodies culled from historical and vernacular sources in art, advertising, and the media. She investigates and correlates ideas about technology and power which have a long history in Western Culture, and illustrates that despite sweeping changes in technology, we are repeating old paradigms. The author suggests that an alternative and liberatory vision of cyberspace is both necessary and viable, and is available to us in the mythopoesis of our pre-scientific past.

Susan Ressler is an Associate Professor of Art, Department of Visual & Performing Arts, Purdue University, West Lafayette, IN

12:00 - 1:00 LUNCH TIME

IN THE CUTTING EDGE GALLERY

12:00 - 1:15

VIRTUAL ARTS THERAPY - Rebecca Mercuri, Sister Jean Anthony, Joseph Reilly & Mike Mosher

will each contribute to this exploration of how using interactive multimedia to construct immersive virtual environments can be tailored specifically to an individual's therapeutic needs. One could walk through a re-creation of one's childhood home, or a stressful event. . .any volunteers?

Sr. Jean Anthony and Rebecca Mercuri will examine those therapies which, through the use of technology encompass one or several of the arts as a medium of communication, or as a pallet upon which clients, therapists and other participants may reveal non-verbal, expressive ideas.

Joseph Reilly will demonstrate "Lightening," a gestural MIDI device used in therapy with mentally handicapped adolescents and adults. He will discuss how techniques using this system are being developed to diagnose specific aberrant conditions, and how it can also be used to reveal patient progress. A live music therapy session will be conducted involving SCAN attendees.

NOTE: Mike's portion of this panel will take place in the Stearns Auditorium at 4:30 immediately following Charles Ostman's presentation on Virtual Reality As An Art Medium. This is because both presenters are presenting live from the San Francisco Bay area, and will be in fact using the same facility for transmission - a little "networking" on our part, see below.

TAKE SCAN FOR COLLEGE CREDIT!

Immaculata College has arranged for a one-credit graduate special topics workshop to be offered in conjunction with this year's SCAN. Students will attend the Virtual Arts Therapy session during the SCAN conference, as well as the other lectures. On Nov.11th, enrollees will attend a full day hands-on workshop at Immaculata where they will design Virtual Therapies. For more information on the "Technology in the Creative Arts Therapies" workshop for credit, contact: Sr. Jean Anthony 610 647 4400 x3490

2:00 - 4.00

21ST CENTURY PEN PALS, A FAMILY EVENT - Paul Wilson

Parents and kids will produce artwork on computers to be exchanged, re-worked and returned by others in remote sites via the Internet.

1:00 - 2:15

PANEL: GRIDS, GUYS AND GALS: ARE YOU OPPRESSED BY THE CARTESIAN COORDINATE SYSTEM? - Greg Garvey, Connie Coleman and Susan Ressler, Walter Wright

Why are most enthusiasts for VR and Telepresence boys? Why is Tetris preferred by most women over other video games? This panel will address these questions tongue-in-cheek, but at the same time will examine the very real and palpable issues of gender differences regarding computer technology in general and computer graphics in particular.

Greg Garvey is Assistant Professor in the Department of Design Art at Concordia University in Montreal, Canada teaching computer graphics and multi-media. His Automatic Confession Machine was first exhibited at SIGGRAPH '93 as part of the "Machine Culture" Exhibition, and later was awarded first prize in the 1994 Toronto Digital Media Awards.

Connie Coleman is a visual artist, designer and educator who has been working in electronic imaging for twenty years. Her video and computer graphic work has been widely exhibited, most recently at the Philadelphia Museum of Art, the Print Club, the Painted Bride Art Center and broadcast on WHYY-TV. She is currently managing a CD-ROM project at LeHigh University for Irwin publishing and teaching computer animation at the University of the Arts.

2:15 - 3:00

Book signing after sessions in rear of auditorium!

UNUSUAL APPROACHES TO 3D ANIMATION - Michael O'Rourke

Michael will deal with innovative approaches, both aesthetic and technical, to three dimensional computer animation. The talk would be illustrated by six short animations, each one selected to illustrate a combination of aesthetic and technical points. He'll also sign your copy of his book Principles of Three-Dimensional Computer Animation, (which is offered at a 33% DISCOUNT through SCAN).

Michael O'Rourke is an artist and Associate Professor in the Computer Graphics Department at Pratt Institute in New York City. He was a contributor to a Clio award-winning animation and a first prize winner at the Los Angeles Animation Festival.

3:00 - 3:45

INTERACTIVE PERFORMANCE AND THE NEW INSTRUMENT Mark Coniglio & Dawn Stoppiello

Composer Mark Coniglio and choreographer Dawn Stoppiello describe the use of experimental sensory devices in the performance of live art, and the importance of seeing these devices as new incarnations of the musical instrument. This presentation will include excerpts from their dance performance "In Plane" which uses Coniglio's MidiDancer hardware, a sensory device that allows movement to control music, light and image.

Coniglio and Stoppiello have taken part in several residencies at sites like Atlantic center for the Arts and Arizona State University, and have lectured on the integration of live performance and technology at universities on both the east and west coasts. Before moving to New York in 1994, Coniglio was on the faculty of the California Institute of the Arts

3:45 - 4:30

VIRTUAL REALITY AS AN ART MEDIUM - Charles Ostman

"Visitors who drop by my lab are sometimes surprised to see nothing that even remotely resembles an "artistic" process. Usually, about the only visible evidence of something artistic going on might be some code listings, or an occasional 'test run' which might yield some abbreviated representation of a polygon structure, or a patch of some evolving texture. However, when all of the elements of a given scene are combined and rendered, the result is an art form completely unique, and specific to the computer as a tool. It is in this way that 'impossible' virtual worlds can be explored, from events that defy the 'ordinary' rules of nature, to the 'evolution' of virtual life forms as they exist in an alien environment.

Charles' presentation will be delivered from his MONDO office in Berkeley, CA, via CUSEEME

Charles Ostman has spent more than 20 years working in electronics, physics, and computers including eight years at Lawrence Berkeley Laboratory at the University of California, Berkeley. He's currently a member of Nanothinc, a San Francisco based nanotechnology focus and development group. Ostman is also an author/technical editor for several technology and "future culture publications including Midnight Engineering, and Mondo 2000.

4:30 - 5:00

- Mike Mosher

Mike Mosher will participate from the left coast via the Internet and World Wide Web. He and his interactive art projects will form an inspirational cyberglossolalic event, illustrating that virtual therapies need not be constrained by proximity.

Mike Mosher will participate from the left coast via the Internet and World Wide Web. He and his interactive art projects will form an inspirational cyberglossolalic event, illustrating that virtual therapies need not be constrained by proximity.

5:00- 6:00

METATOOLS - Michael Hanes

Watch Michael put CONVOLVER, Vastly updated LIVE PICTURE, and KAI'S POWER TOOLS 3 through their paces.

6:00 - 8:00 SUPPER TIME

SCAN '95
Saturday Evening Performances

Stearns Auditorium
8 pm - 10 pm

Steve Berkowitz, Rogue Master of Ceremonies

The Moment of Totality
from "Celestial Mechanics"
Stardust
title track to their forthcoming CD
The Relic,
title track from Chuck's latest solo CD
Chuck Van Zyl & Peter Gulch

Peter Gulch is best known as the founder of "The Nightcrawlers," recording "The Nightcrawlers", "Spacewalk", and "Shadows of Light."
Chuck Van Zyl has recorded "Celestial Mechanics" and "The Relic," released by Centaur Discs. He has also hosted the Star's End show for WXPN Radio for the past 15 years. Together they have released "Regeneration Mode" for Synkronos Music and are working on a new release entitled "Stardust."

Granulations
Dennis Miller

written for performer playing a Kurzweil K2000 Sampler. All of the material is derived from three original sounds on a kyma synthesis workstation, then transferred to the Kurzweil for further processing, most notably time expansion and filtering. There is a minimal pitch component, primarily at the opening of the piece. The majority of the design elements can be accounted for by the desire to attain a balance between unity and contrast.

Dennis Miller received his Doctorate in Composition from Columbia University and is now a member of the faculty of Northeastern University in Boston. His concert music has been performed throughout the US and Canada.

Shake Well Before Opening

Peter Price & Mauri Walton

This piece incorporates, movement, text, sound collage and projected photographic and computer generated slide imagery. It portrays a foray into an interpretation of alternating perceptual juxtapositions and sometimes the source of these perceptions.

Peter Price is a composer utilizing computers for most of the thirty-five pieces he's performed in the Philadelphia and Washington DC area. J
Mauri Walton uses computers for her visual imagery. She is also active as a dancer and actress.

Brian James

will produce an ambient vinyl mix, digital samples plus graphics.

Cthugha 5.0

Don Slepian

a sound driven computer animation system written by Zaph (Kevin Burfitt) of Victoria, Australia, (zaph@torps.apana.org.au). In this system, the audio input of a Sound Blaster 16 card is used to modulate the size and intensity of abstract graphics which can be controlled in real-time from the computer keyboard. This software is available free on the Internet. Cthugha shows the theatrical and live performance potential of multimedia computers.

Don Slepian is an internationally known electronic musician, recording artist, and concert performer. He's also been a consultant in computer music for Yamaha, Bell Labs, and Bell Communications Research.

NOTE: Due to equipment failure, Scot Fisher will not partake in this year's festivities.

Sunday, November 5th

9:00 - 10.00

MACROMEDIA - Sam Gottlieb

will be speaking about the importance of a solid understanding of the rules of the Lingo language. He'll create interactive movies which control digital video, sound, animation, and more. Sam will talk about optimizing the performance of movie's for speed and memory.

He will then demonstrate SHOCKWAVE, the procedure for running Director files directly off of the internet. Sam will log onto a server in San Francisco and"grab" some Green Fried Director Movies, as they are called, and play them real time off of the NET.

Next, Sam will demonstrate Extreme 3-D, Macromedia's newest 3-D software. Prerendered Quick Time movies will also be played.

There will be time for questions between each section. Sam will take orders for upgrades and for purchasing Macromedia software at the end of the session as well as during the show. See the person at the table for the price sheet.

Sam Gottlieb is a multimedia producer and consultant as well as the co-author of Macromedia Director Lingo Workshop. He has taught at The Art Institute of Chicago, Columbia College, and at NYU - Tisch School of the Arts.

10:00 - 10:45

ROBERT SMITH

A CD-Rom Auction Game, Virtual Sculptures in a VirtualGallery on the Web, a large-scale sculpture installation at the Sculpture Center, and Intersculpt, the Philadelphia - Paris sculpture teleconference at the Silicon Gallery, are the projects that have kept Robert Smith busy.

10:45 - 11:30

INTERACTIVE ART/SCIENCE PLANETARIUM EVENT ON CELL BIOLOGY: A REPORT ON A WORK IN PROGRESS - Rob Fisher

The Carnegie Science Center and Carnegie Mellon University have joined forces to create the "Group Immersive Visualization Enviromennt." GIVE combines video, computer graphics, stereo 3D and interactivity into a dynamic display (with much of the impact of VR) on the dome of the planetarium. Rob is the artistic director of the first presentation, Cell Project, an interactive journey into a living cell.

Rob Fisher produces large-scale Environmental Sculpture, and is pre-eminent among Computer Sculptors.

11:30 - 12.00

LOST IN THE PHOGG - Tim Duffield & Jeff Brown

Tim's expertise is in sculpture and landscape architecture, Jeff's is in computer animation, photography and video. Their new company, Phogg is creating architectural animations - walk throughs of buildings and sites that are still on the drawing boards. They'll show their first products — animations for the new Core States Center (the new Spectrum replacement) and the University of Virginia.

Tim Duffield is a Landscape Architect, and Computer Sculpture Pro-Activist. He's a consultant to the Graduate Landscape Program at the University of Pennsylvania, helping them to integrate computers into the landscape curriculum. He'll also be teaching a six-week studio there in the spring.

Jeff Brown has many years experience with Computer Animation, which he teaches at the University of the Arts, Photography and Video.

12:00 - 1:00 LUNCH TIME

1:00 - 1:45

VIRTUAL REALITY IN INDUSTRIAL DESIGN - Mark Scott

The Advanced Driver Interface Design/Assessment Project funds The University of the Arts' Masters of Industrial Design program, and ties the school with The Pennsylvania Department of Transportation and The University of Pennsylvania's Center for Human Modeling & Simulation. As Systems Developer on this project, Mark will speak about the role which virtual reality can play in the design and testing of vehicles.

1:45 - 2:30

artifact, 1995: LENSLESS DIGITAL PHOTOGRAPHS - Steve Berkowitz

The search for infinite resolution is a photographer's dream, and Digital Photography holds the potential to make this dream a reality. The search leads to artifacts rather than detail Ñ artifacts from scanning, from enlargement, from enhancement, from printing. If one has a positive mind, however, these artifacts, errors in coding, can be used as creative elements within images. And if one is shooting pictures of dead foliage, which is by definition artifact, then the looking and the looked at are entwined in a self-similar (fractal) relationship.

Steve Berkowitz has been working with digital imaging, both visual and aural for over 20 years. He is presently teaching both undergraduate and graduate courses in Digital Photography at Tyler School of Art where he is an Assistant Professor.

2:30 - 3.00

COMPUTER DESIGN: A CHANGE IN THEATRE CURRICULUM - Bill Marshall

For centuries, the procedures used in creating theatrical designs have not changed. Being involved in the personal craft of perspective drawing, rendering, drafting and painting is a large and enjoyable part of the making. How does one bring this exciting technology into a design curriculum without sacrificing craftsmanship or artistic struggle?

OPERATIVE TERM IS STIMULATE - Mike Maier

Mike will talk about the Online Collaborative Art Group, OTIS. "Otis, at its most basic interpretation and intention, is a place for image-makers and image-lovers to exchange ideas, collaborate and, in a loose sense of the word, meet."

Michael will take us on another joyride with cyberartists on the net via OTIS through a 24hr gallery, email lists, real-time improv painting parties, and (hopefully) a CUSEEME demo of realtime art exchange.

Michael, both a graphic designer and illustrator, is an avid Internet fan, and specializes in visual solutions for World Wide Web page design. He has been affiliated with OTIS since its creation and, as a result has shown his work worldwide. Currently, he lives in Philadelphia designing and implementing Web Sites.

Art Exhibition

Silicon Gallery
November 3 - 30th, 1995

139N 3rd Street, Philadelphia PA19106
215-238-6063
Hours 9 - 5 Daily 1-5 Saturdays

Steve Berkowitz, NY, NY	Artifact	Displaymaker Print	30 x 20"
Meghan Boody, NY, NY	Justine and Juliette quietly resumed their game of cards		30 x 33"
	The training procedure was frequently observed		30 x 33"
		Iris Print, watercolor paper	
Gloria De Filipps Brush,			
Duluth, MN	6505	Laserprint	11 x 14"
	6495		
	6485		
Deena des Rioux, NY, NY	Esther: Bionic Punk	Print on Polyester	
Tim Duffield, Philadelphia, PA	Hermes II	Bronze	
	Sentinel I	Fiberglass	
Kathleen Chmelewski,	Owl Dream	Digital Collage	12 x 12"
Urbana, IL	Lightening	Digital Collage	12 X 12"
Mel Fisher, Philadelphia, PA	Creation	Plastic, PVC	45 x 48 x 6"
Rob Fisher, Pittsburg, PA	Wisteria	Silkscreened Aluminum	
Kevin Gallup, Newport News VA			
	Metamorphosis	Bronze	
Michael Gargiulo, Norwalk, CT	Past Lives, Beers and		
	Buccaneeers	Video Tape	
Chuck Genco, NY, NY	Eye Box	Wood, Bronze, Glass,	
		Electronic Parts	6 x 8 x 12"
Steve Gildea, Philadelphia, PA	IO	Iris print on watercolor paper	4 x 4"
	Ganymede	Iris print on watercolor paper	4 x 4"
	Miranda	Iris print on watercolor paper	4 x 4"
Petra Karadimas, NY, NY	Alexandra	Digital Print	18 x 12"
Robert Mauro, Turnersville, NJ	Earthrise	Iris Print Arches Paper	10 x 14"
David Morris, NY, NY	Cricket Dance	Water, Glass, Corien,	
		mechanical parts	
Jeannie Pearce, Wynnwood, PA	Ship	Dye Sublimation Print	7.5 x 10"
	Stonehenge Monks		7.5 x 10"
	Hand		7.5 x 10"
Corinne Segal, NY, NY	Self Portrait w/Dead Ancestors		
		Print on Canvas	27 x 30"
Bruce Shapiro, Edina, MN	Lepidoptera I	Steel	
David Smalley	Sculptor's Dream	Bronze, Steel, Glass	21 x 18 x 4"
Robert Michael Smith, NY, NY	God's Eye Yearn	Iron, Steel, Bronze	
Barbara Yoshida, NY, NY	The American First Ladies Series		
		Fiery print	13 x 10"
Judith Yourman, St. Paul, MN	Female Offender Flip Book I		
		Computer Inkjet Prints	1.75 x 3.75"
	Female Offender Flip Book II		1.75 x 3.75"
	Female Offender Flip Book III		1.75 x 3.75"

On Edutainment

Bill Kolomyjec Ph.D.

Abstract

Edutainment is something fun and educational. In this paper I share my experience of seeking to understand Edutainment with the reader. I reveal the modern method of obtaining a theoretical foundation and obtaining research material. I talk about how extending the content of a feature film into related media increases profitability and varies the experience. I talk about promoting critical thinking. I explain the concept of leveling an activity based on understanding child development as well as give an example as to how this might be accomplished. I conclude by presenting some thoughts on evaluating Edutainment.

Introduction

Small computers are a major factor contributing to the exploding home entertainment market. One phenomena associated with the multiplicity of desktop machines in the home is the advent of the Technologically Astute Family or TAFy. A TAFy is a technology-hip family unit not just American but global. TAFys have lots of high-tech toys such as home entertainment centers, cartridge (or next generations game players, pagers, cellular phones and at the domestic epicenter they generally have a multimedia computer. TAFys are accustomed to technology, they use it daily for both work, sometimes working at home, and play. At home technology is a bonding agent, parents help the kids with technology and often the kids help the parents. The TAFy phenomena has added significantly to the growing demand for content, be it audio, video, cartridges games, work and play software and CD-ROM titles. Many companies are scrabbling to provide content products to meet this demand - it's today's fastest growing market.

I work for a company that seeks to be a major player in this market. I have witnessed my high-tech employer evolve from a hardware company (a maker of tools) to a software publisher (maker of mass market multimedia software) to an Animation Studio (a content provider) and I have had to evolve as well. In my latest incarnation I have been directed to be the evangelist for education in our Edutainment products, the "guru of edu," and I have willingly accepted this challenge.

The intent of this paper is to share with the reader my journey toward understanding the task of producing Edutainment. We've all heard the term but what does it mean? Let's begin with the definition that Edutainment is an entertainment experience or product that incorporates aspects deemed to be educational to increase overall worth or perceived value. In other words, edutainment is something fun and educational.

Theoretical foundation

I recall when I was working toward obtaining my Ph.D. in Education I did research in a "research library." I remember many pilgrimages to the campus central library in search of knowledge. I would start out in the reference section or searching card catalogs for substance then rudge up into the stacks in search of this or that tome. I got pretty good at this medieval method of doing research but this process occasionally produced frustration when the book or periodical I sought was out of date, or worse, not to be found.

Today I've learned to cruise on the Internet for information. Using a popular application and typing in a few keywords you can find tons of information. This is exactly how I began investing Edutainment. By culling through a mountain of hypertext I was able to build a nice theoretical foundation to assist me on my quest to understand Edutainment. I don't intend to do a review of literature but I will recommend one scholarly attempt to you. *State of the Art Review on Hypermedia Applications and Issues* by V. Balasubramarian. This is an interesting look at the roots of hypertext and hypermedia. (Hypermedia is just hypertext with graphics and sound!) There's lots of good

stuff like this on the Internet. I found this review in cyberspace at:

http//www.isg.sfu.ca/~duchier/misc/hypertext_review/index.html

My Internet search also lead me to the Scholastic Home Page where I found the Ultimate Education Store. Remember those Weekly Readers? They came from Scholastic.

http://scholastic.com:2005/public/Home-Page.html

From there I was able to browse through "professional" education material offerings and download an order form that in turn allowed me to fax Scholastic an order for two books on Critical Thinking which made a significant impression on me as you will discover later. Almost all large publishing companies (such as Simon and Schuster, Time Warner, etc.) and educational publishing companies (such as, Jostens, Scholastic, The Learning Company, etc.) are into Edutainment these days and have appropriate information about their products on Internet. It is worth mentioning that the later phase of my research lead me to Toys'R Us and a large bookstore called Border, Books and Music. Toys'R Us is a great field trip, there are aisles of board games and toys that are age rated. I found the best ways to survey age-rated materials (games and activities) is to take an hour and read all the boxes. The Border, Books and Music bookstore is a generic bookstore supermarket. It contains ample sections of latest books on games, education, child psychology and child development as well as an espresso machine.

Extending Content

By way of background, Pixar is producing for Disney the world's first completely computer generated feature length film called Toy Story to be released November, 1995. It should be a big hit. In Hollywood jargon the feature film Toy Story is known as a "property" and anything related to the production of the film (real or virtual) is called an "asset." To maximize profit ('cause that's what keeps us in business) Pixar has created a CD group for the purpose of re-using the assets of the Toy Story to produce related products for the home entertainment/ educational market.

The first product from Pixar's CD group will be the Toy Story Animated Story,Book (TSASB) scheduled for release early 1996. The target market for this product is children age three to seven. (Actually, the parents of children 3 - 7 since they make the purchase.) TSASB aims to leverage the expected popularity of Toy Story by making it available for multimedia computers thereby creating the opportunity for increased profitability. It extends the experience as well. A film experience is linear, a CD-ROM experience is interactive and non-linear. Typically a child is taken to a movie theater to see a film where the child watches the film. The child has no way to interact with the story or its characters. The CD experience is different. A child can view or revisit the story and its characters in more a personal way û in their own homes and at their own pace.

A second product under consideration is the Toy Story Activity Center (TSAC) where assets from the feature are again used to provide an immersive environment for learning-based activities. The target market for this title will be for slightly older kids, namely,

Kindergartners through fifth graders. Using the content from the feature these children will be able to more deeply interact with the story and its characters. If all goes according to plan, the child will be invited into the virtual world of the story and, once there, be able to interact with its principle characters in interesting and educational ways. Hopefully, it will be great fun and have educational benefit.

Critical Thinking

I was so impressed with the Critical Thinking (CT) pedagogy and materials that I obtained from Scholastic that I proposed to our CD-ROM development group we use the elements of CT as

a means of identifying educational attributes in the various activities of our Edutainment products. To illuminate Critical Thinking for you I've presented below a short summary of CT concepts and the CT hierarchy (Rozakis, 1991.) These books consist primarily of classroom activities for children that promote CT skills in an orderly, fun way. Some activities involve the teacher, some activities involve groups and some are oriented toward individual work and take the form of paper and pencil activities.

Critical Thinking as concept

Simply stated, this is the essence of critical thinking. We are not born critical thinkers hut critical thinking can be taught and learned. Thinking about the thinking process is to be encouraged û it leads to critical thinking. The goal of critical thinking is to encourage children (or adults) to become more successful and active learners.

The Critical Thinking Activity hierarchy

In real life critical thinking skills are used simultaneously but CT elements are usually presented serially to children to systematically teach them how to think.

1. **Recognizing and Recalling** Attempt to tap (remember) prior knowledge and experience û the first step in critical thinking.
2. **Distinguishing and Visualization** Distinguishing between important and unimportant data and visualizing problem solving strategies leads to more logical and effective thinking patterns.
3. **Following Directions and Classifying** Learning to work through a process a step at a time and bringing order to a process by organizing its pieces based on similarity.
4. **Sequencing and Predicting** The ability to sequence detail and predict information based on prior knowledge.
5. **Inferring and Drawing Conclusions** To gather information and reflect on experience. Use of multi-sensory clues to make inferences and draw conclusions.
6. **Evaluating** Evaluating means making a judgment about something. Many evaluations are made during a single day.
7. **Analyzing** To break a problem into smaller parts and think about each step on its own. Analyzing a problem this way improves ones ability to better predict possible outcomes and to propose solutions that make sense.
8. **Synthesizing** Putting together known information to figure out new things.

I believe these are basic skills and that they ought to be taught to all children in school. But here is an opportunity for Edutainment. Promoting these skills in an Edutainment product is a ideal way to use the media to introduce these skills and/or reinforce them.

Leveling

I would like to share with you an example of leveling an activity for an Edutainment product. Without divulging too much about the product before it is released I can tell you about one idea we're considering for the Toy Story Activity Center.

Inspired by a story point in the film we thought it would be interesting if a child could play checkers with one or more characters from the feature. I will not focus on the challenge of creating a novel and fun interface to do this, rather I will focus on the challenge of "leveling" a checkers activity for the 4 - 10 year old age range (grades K 5.)

Creating an activity for children four to ten years in age is challenging and requires a thorough understanding of the dynamics of this group. After some investigation I came to the conclusion that understanding the notion of play and what educational psychologists can tell us about child development could improve my ability to correctly influence an Edutainment product. Luckily, I was able to find a couple of recently published books on the subject.

From Toys, Play, and Child Development (Goldstein,1994. p. 10) we learn there are stages play that correspond to roughly to a child's development process. The first stage which occurs from birth to 2 years of age is characterized by imitation (use of reflexes, repetition of sound and beginning of symbolic representation) and practice and mastery (sensory play, ritualistic play and simple make believe.) The second stage which occurs from 2 - 5 years is characterized by symbolic play (play that distorts reality, implicit representation, parallel play and compensatory play.) And in stage 3, beginning about age seven, children are ready for games with rules (games with rules involve competition, codes that are institutionalized, or temporary, spontaneous agreements.) Most popular board games fall into this later category. This book has a great collection of related articles. We'11 be looking closely at one further on.

Another noteworthy find was: The Best Toys, Books & Videos for Kids (Oppenheim and Oppenheim,1994. pp. 53-4 and pp. 95-6.) this consumer report-like publication tells parents what to expect developmentally from children in certain age ranges and what kinds of toys are appropriate for a particular age range. It claims to be an "independent" buying guide (originally know as The Oppenheim Toy Portfolio which began in 1989.) Here are some excerpts worth sharing:

Preschool - three's and four's

1. Learning through pretend - kids are learning machines developing language, imagination, concepts of self and others.
2. Social play - increases.
3. Solo play - becomes more focused.
4. Toys and development - informal play is best path to learning. Make basic math and science discoveries.
5. Parents roles in play - periodically inventory child's toy clutter to see what's really being played with.

Comments/ recommendation about games for this age group.

1. Preschoolers are not ready for complex games.
2. Best bets are games of chance where players depend upon luck of the draw rather than skill. Hard concepts are taking turns and winning and losing.
3. Cooperative play games that are quick and short so there can be lots of winners.
4. Solitaire matching games.

Early school years ages five through ten

1. Learning through play - play augments learning in school.
2. Dexterity and problem solving ability - can handle more elaborate building toys and art materials. These children are curious how things work. They take pride in making things.
3. Active group play - group activities and team sports.
4. Independent discovery - benefit of solo activity.

Comments/ recommendation about games for this age group.

1. These are the ages kids really enjoy playing games.
2. Winning is still more fun than losing.
3. Playing by the rules isn't always easy.
4. Many of the best board games are entertaining and educational.
5. Game playing also builds important cooperative social skills.

Based on this information I discerned an educational activity for the age range 4 - 10 clearly spans two distinct phases of a child's development. Children under age 6 are typically not ready to play a classic board game such as checkers! I proposed we should take a thematic approach, namely, to design a range of activities around checkers. Separate but related activities would take

into consideration both the younger pre-checkers children, in the age range 4 to 6 as well as the older developmental group 6 through 10 years of age. Children under the age of six would use checker materials to do shape and sequence matching, activities more suited to their development. And for children older than six, a checkers game engine would be designed to play at various levels, easy, medium and hard.

Presented below are the specific game elements of the various levels of the checker activity I put together. The first two levels use the physical elements of checkers (the game board and the pieces) for shape and pattern recognition activities. Levels three, four and five are variations of the classic game of checkers with varying degrees of difficulty.

Level 1 - Shape Matching

Preschool activity which focuses on shape matching and recall.

(Critical Thinking skills represented: Recognizing and Recall, Distinguishing and Visualization, Following Directions.)

Patterns consists initially of 3 checkers and progress to 8 checkers. A pattern consists of adjacent checkers of one color. To successfully complete the task the child must EXACTLY duplicate the pattern displayed. (Mirror images or rotations are NOT EXACT matches.)

The character at this level narrates the initial making of a pattern consisting of checkers of one color randomly located on the 8x8 checkerboard-like grid. There are two stages to this level. For stage one the pattern is left visible on the game board and the child may use it as a visual reference to observe and duplicate. The child places a checker by clicking on an empty square. Pattern size increase by one after each pattern is successfully duplicated. Upon completion of a pattern consisting of 8 checkers the second stage automatically begins. The child is presented with a random pattern of three adjacent checkers. Upon the first mouse click the pattern disappears and the child must duplicate this pattern from memory. The number of checkers in successive patterns increase by one as in the non memory rounds. If a child fails to place a checker correctly after four tries the target pattern is revealed and another pattern of equal length is presented. Successful completion of the second stage or, memory round; returns the child to the start of the memory round (with a 3 piece shape.)

Level 2 - Sequence Matching

Preschool activity based on replicating patterns (sequences) and recall.

(CT skills: Recognizing and Recall, Distinguishing and Visualization, Following Directions and Classifying and Sequencing and Predicting.)

Linear patterns of 3 checkers progress to linear patterns of 8 checkers in length. A linear pattern consists of a string of adjacent red or black checkers randomly formed. Strings can be oriented in columns (vertical) or rows (horizontal.) To successfully complete a task the user must EXACTLY duplicate the sequence. Exact duplication means identical left to right if horizontal and top to bottom if vertical, reversals are NOT EXACT matches (unless the string was symmetrical!)

The character at this level narrates the initial making of a pattern consisting of either a row or column of randomly chosen red and black checker pieces located anywhere on the 8x8 checkerboard-like grid. Two piles of checkers are available at the margin of the checkerboard to drag checkers from onto the board.

There are two stages to this level. For stage one the pattern is left visible on the game board and the child may use it as a visual reference to observe and duplicate. Pattern size increase by one after each pattern is successfully duplicated. Upon completion of a pattern consisting of 8 checkers the second stage automatically begins. The child is presented with a random pattern of three checkers. Upon the first mouse click the pattern disappears and the child must duplicate this pattern from memory. The number of checkers in successive patterns increase by one as in the non-memory rounds. If a child fails to place a checker correctly after four unsuccessful tries the target pattern is revealed and another pattern of equal length is presented. Successful completion

of the second stage or, memory round, returns the child to the start of the memory round.

Level 3 - Easy (Polite) Checkers

(Utilizes all Critical Thinking skills)

The computer tries not to jump - the computer knows all possible legal moves and randomly selects one non-jump move. Exception: if all non-jump moves are blocked but a jump move is available then the computer will jump.

The user may make any legal move but is NOT forced to take a jump. The rules of checkers require the player to always jump the opponent's checker, at this level this rule is suspended.

Level 4 - Medium Checkers

(Utilizes all Critical Thinking skills)

The computer may make any legal move but if a jump move is available then it must make a jump - the computer knows all possible legal moves, if a jump move is available then the computer takes it, if more than one jump move is available the computer randomly picks one.

The user may make any legal move if a jump is available then it must jump û the computer will not allow a non-jump move when a jump move is available.

Level 5 - Hard Checkers

(Utilizes all Critical Thinking skills)

The computer plays it's best - the computer evaluates all possible legal moves looking ahead several levels of play.

The user may make any legal move if a jump is available then it must jump û the computer will not allow a non-jump move when a jump move is available.

We tested these levels of play on several groups of children during our initial product prototyping testing sessions. Initially, we manually tested the ideas. Subsequently we put together a stand alone application and tested them again. The feedback from kid testing lead us to believe the design was working. The next step was to formalized the game elements for incorporation into the TSASB functional specification for broader review.

This is as far as we've progressed on the checkers activity to date. After the components of the user interface are animated and prototyped they will be integrated with the game engines into the product. Then we'11 test it again.

Evaluation

In my opinion evaluation of an Edutainment product should occur in at least three areas: education, entertainment and product sales. I'll address education last.

The entertainment value of an Edutainment product can be judged by how long it holds a child's interest. Simply put, its appeal. A child will play with an appealing product repeatedly. A child that finds a product unappealing will play with it initially, get bored, and never to come back to it again. Of course, this varies from child to child. In our testing we've seen all kinds of kids. Some children are slow and methodical. Some children play the prototype like a twitch-and-thrill game. Sometimes children need to be helped by a parent. And, sometimes children just aren't in the mood.

A successful product sells. Software Publishers Association and other many trade newsletters and magazines publish top ten sales by category charts regularly so you can always get a feel for the market, i.e., what's hot and what's not. Since the CDROM Edutainment market is so new we are only beginning to understand what's successful. The following example might give you some idea of what's at stake in producing a CD-ROM title for today's market.

From what I have been told a good selling CD-ROM based Edutainment title sells about 75,000 copies. A great selling Edutainment title sells about 150,000 copies. Assuming a $10 profit off the sale of a $40 product (an educated guess) the return from such titles would be $750,000 and

$1,500,000 respectively. Note, these figures do include distribution costs but do not include any marketing or advertising expenditures which can, depending on how heavily the product is promoted, significantly cut into overall profit. The unknown is how much does it cost to produce a good or great CD-ROM title. From what I can discern a CD-ROM title rarely costs less than $500,000 to produce.

I'd like to take a minute to focus on issues related to evaluating educational aspects. In an article in **Toys, Play and Child Development** entitled *Educational Toys, Creative Toys* Brigitta Alqvist (Goldstein Ed., pp. 48 - 66.) traces the history of educational toys back to the English philosopher John Locke. She reckoned that Locke's alphabet letter blocks toys were intended not only to educate but also to keep middle class children off the streets and away from the influence of children from lower class families. She points out that more recently, in the late 1960's, Sputnik and the space race revitalized the notion of the educational toy. Parents became so concerned that their children where not getting the best possible education in public schools (the Russians beat us into space so their math and science educational efforts must be superior) that they sought to augment their children's education with educational toys.

Since the 1960's a lot of systematic research has gone into the concept of what is an educational toy and here are the startling findings: "On the basis of systematic research as well as logic, it may finally be claimed that educational toys is a nonsense term." (Alqvist, p. 56) Furthermore, studies have revealed there is little evidence between toys and achievement. Because a toy used in a school or educational setting it does not necessarily mean that it has any special educational properties. In fact, most toys are educational in some respects, i.e., have information potential. It all comes down to the way in which a toy is used.

Knowing the concept of an educational toy is a myth how can any toy or activity claim to be educational, and by extension, how can we have Edutainment products - products that are both fun and educational? To address these issues I propose three criteria for evaluation: intent, appropriateness and degree to which learning is facilitated.

Intent

It is possible (knowingly or unknowingly) to include dubious or poorly designed educational aspects into a product to broaden market appeal. An article recently published in The Wall Street Journal entitled: *PC's May be Teaching Kids the Wrong Lessons,* (Hays, 1995. p. B 1) cited a study that suggested that a type of reading/ storytelling software had the potential to harm pre-schoolers. The cited study claimed it found lower creativity scores on a standardized test for subject who used such software under experimental conditions. How does the general public know if an educational product does what it purports to do? If such educational products do not live up to their claim of being educational or are educationally harmful are the publishers subject to prosecution?

There should be some basis to a product's claim that it is indeed educational and perhaps it should specify what aspect of the child's learning experience is to be augmented. Just because a product claims to be educational (is intended for the educational market)shouldn't be good enough. Is the intent of the educational designation to sell more product or to enrich learning? If the latter is claimed then how is that claim substantiated.

Appropriateness

Is Mortal Combat Edutainment? If used in an appropriate context then certainly. Is Math Blaster Edutainment? If used in-an appropriate context then certainly. Is the Lion King Animated StoryBook Edutainment? If used in an appropriate context then certainly. What's appropriate depends on context. Context is provide by the parent or another responsible adult such as a teacher not the child.

Degree to which Learning is Facilitated

Parents, other responsible adults or older siblings can always add more value to the educational experience. With small children the parent will most certainly have to show the younger child how to load, launch and navigate a product. Better yet the product ought to provide a quality experience when shared. Hopefully the product will be well designed so that the younger user doesn't get boxed-in or have the program lockup or abnormally terminate during a session.

Quite often parents buy children Edutainment to keep children busy so that they can do the laundry or clean the house or just have some time to themselves. The product in effect plays the role of baby sitter. As I stated earlier, a fun product will hold a child's longer.

The trick is to make a product both fun and educational. This is the ultimate test of Edutainment.

Rating Groups

Finally, there are competing rating systems emerging to give the parent or consumer an indication of the Edutainment products appropriateness. I know of the Entertainment Software Rating Board (ESRB) and the Recreational Software Advisory Council (RSAC) to name a couple. Rating boards are paid by publishing companies to perform a service. This is voluntary not mandatory.

More and more rating groups will play a contributing role toward a product's marketability. Rumor has it that WalMart and other giant distribution outlets will not place any Edutainment products in their stores without such a rating. These rating will invariably help parents make their decisions.

Conclusion

Edutainment should be something fun and educational. In this paper I shared my experience of seeking to understand Edutainment with the reader. I revealed the modern method of obtaining a theoretical foundation and obtaining research material. Research is not what it used to be. Almost any subject came be researched over the Internet. Other relevant and contemporary information can be gathered in modern retail outlets.

The concept of extending content is becoming very popular. The assets of many major motion pictures are being recycled into CD-ROM entertainment/ Edutainment. Expect to see more of this in the future.

I have discussed how we have chosen to promote critical thinking in our CD-ROM based activities. There is no reason why a child should walk away from an Edutainment CD-ROM without learning something valuable. Leveling is a way of creating an ensemble of age appropriate activities around a single theme. Leveling is facilitated by understanding the principles of play and childhood development as well as market research on existing age rated activities and consumer report materials.

Evaluation of Edutainment can be achieved by considering the educational, entertainment and product sales. Education is the most subjective because it requires making inferences about intent, appropriateness and measurement of learning. Entertainment qualities can be observed. Did the product appeal to the child? (Just watch children use the product.) How long did the child use the product (Something that can be measured.) And, financial success of product can be measured using objective business criteria such as number of units sold and return on investment.

Rating group are proposing standards for rating Edutainment to assist consumers with their buying decisions. Ratings are currently obtained on a voluntary basis (they are not mandated.) The role of these groups will probably increase in future.

Educators (and former educators such as myself) can play an important role in the new media by teaming up with content providers to share what they know about learning. It is an amazing experience to work with a publisher to design education into a content product. The goal is always to produce the best Edutainment.

References

Goldstein, J. H., Ed. **Toys Play and Child Development.** Cambridge University Press. 1994.
Hays, L. **PC's May be Teaching Kids the Wrong Lessons,** *The Wall Street Journal.* Monday, April 24, 1995.
Oppenheim, J. and Oppenheim, S. **The Best Toys. Books & Videos for Kids** 1995 edition. Harper Perennial. 1994.
Rozakis, L. **Critical Thinking for the Primary Grades.** A Scholastic Instructor Book for Grades K - 3. Scholastic Professional Books, 1991.
Rozakis, L. **Critical Thinking for the Middle and Upper Grades** A Scholastic Instructor Book for Grades 4 - 6. Scholastic Professional Books, 1991.

Recommended Reading

Brown, Eric, **That's Edutainment! A Parent's Guide to Educational Software.** Osborne/ McGraw-Hill. 1995.

Rating Board Contact Information

Recreational Software Advisory Council. (RSAC)
2067 Massachusetts Ave., Fourth Floor Cambridge, MA
(617) 864-5612

Entertainment Software Rating Board (ESRB) 845 Third Ave.
New York, NY 10022
(212) 759-0700

Bill Kolomyjec Ph. D
Education SpecialistPixar Animation Studios
1001 West Cutting Blvd.
Richmond, CA 94804

Keeping the Sculpting in Sculpture

Kevin Gallup

The small computer has grown to be an extremely capable device which in the hands of the right person can perform tasks that were unthinkable only a couple of years ago. The term "small" computer can be misleading due to the wide spectrum of "small" computers. The most important differentiation to myself is cost. As an artist who has an interest in 3-D modeling, there are many reasons for having a full-blown system such as a Silicon Graphics computer running software such as Alias Studio. This is an extremely powerful tool that can do some incredible functions. Unfortunately, it is also completely beyond my budget. Fortunately for me, in the last couple years there has been an explosion of software and power of the computer vs. price that has made capable systems to be within the reach of the less affluent. Probably the most important issue with the use of the computer within my art rests in the ability to sculpt in the traditional methods such as clay or wax, and delivering this form to the computer via digitizing for further manipulation.

For my own work, there is very little advantage in the use of the computer for an object such as a medium-sized figure. However, when working either very large or very small, the advantages of the computer become much more obvious. The ability to digitize a small object and scale large or small to create photo-realistic renderings, templates for fabrication, or growing via steriolithography are only to name a few of the typical applications of this process. But artists being what they are, find new ways to push the envelope of the process and discover new applications associated with these new tools to create in ways that were not feasible before.

The ability to create a composition in clay and digitize opens many doors to make really neat stuff. This is due to the really powerful manipulations that reasonable priced software will allow. The bronze casting systems of today (at least my own) allows the use of non-traditional materials and methods that these computer processes produce. To understand why this is possible, one must know the basics of the bronze casting system.

The typical traditional system would have the following steps:

A. Create a model in clay
B. Pull a mold from the model
C. Create a wax copy from the mold
D. Subject the wax copy to the process associated with casting

This process works well, but in an effort to bypass the mold making step (also expensive) and relying on the use of wax (limiting to range of object make possibilities), employing to use of the computer to assist in this process becomes critical.

Consider the possibilities of alternative materials to construct models to be burned out and casted from:

A. Foam-core allows easy construction of faceted objects
B. Typical cloth material such as cotton allows complex sewn patterns
C. High density foams allow precision cutting and routering operations

Each of these materials have unique characteristics associated with the burning out and casting procedure, but have a common element in the ability of the computer to play a role in the sculptural process. This rests in features such as the ability to unfold a 3-D pattern which can be

cut out and assembled, unwrapping a form to be sewn together, or the ability to render a form via a cnc cutting device which in turn can be burned out and casted. These features can allow basically a revolution in the bronze arena.

The biggest limitation to this revolution is twofold: the willingness of traditional foundries to utilize these materials and the ability of sculptors to respond to the abilities of the computer and materials.

A discussion as to the equipment and their advantages could be very lengthy, however a brief rundown of my current system can illustrate the basic components:

A. 486 @ 66 htz w/ 32 meg RAM (minimum)
B. Plotter and printer
C. Software for CAD - Cadkey w/ Fastsurf or AutoCad w/ AutoSurf
D. Rendering software - needs to be compatible w/ the CAD
E. 3-D Digitizer

As for the costs associated with such a system would probably approach $20,000 at a minimum and quickly grow. Probably the most difficult aspect is trying to sort through all the whistles and bells each vender claims for their products. If at all possible, contacting someone who has a system up and running would be the best source of determining the pros and cons to different components.

THE VIRTUAL PALLADIUM:

An Interactive Music and Video Installation

Robert Martin

Abstract

The Virtual Palladium is an installation that is influenced by the first New York City high tech entertainment and video art environment called The Palladium. It allowed its visitors to move within an environment stimulated by abstract video art, working in or out of sync with music. My presentation of The Virtual Palladium will show how a gallery within the Detroit Institute of Arts was transformed into a camera based virtual reality performance art space for anyone that entered. I chose to work with interactive abstract improvised music for the intent of enhancing my goal and effort to empower the viewer and artist to become a participant in the creative process of art making in a world that is still being influenced by the words of Marshall McLuhan.

Introduction

Ever since I started adapting computers in 1986 as a medium for making art and musical compositions, incorporating graphics, film, video, sculpture and interactive/multimedia events, I have directed my efforts to extending the technology to afford new ways for artistic expression for myself and other artists. This is accomplished by using the body as an interface.

The noun interface is taken to be a discrete and tangible thing we can map, draw, design, implement and attach to an existing bundle of functionality. When the concept of the interface first began to become obvious, it was commonly understood as the hardware and software for which a human and a computer could communicate. As it has evolved, the concept has come to include the cognitive and emotional aspects of the artist's experience as well. The term Interface, for me, means combining interactive visual art with performance via camera virtual reality.

Computer technology is simply one aspect of the complex of electronic media devices that is affecting our world and mediating our relationship with it. Art practice is a response to our culture, the making of digital art must be placed in the same context. The overall objectives and goals of my installation is to show how the computer effects art practice and to explore the modernist notion of truth to materials. The focus is to consider the cultural and technological implication of reproduction, representation, and artist content by creating an interactive art installation that can become an indispensible part of our social environment.

History

One might think interactive art would thrive in a high-tech America, where consumer electronics have become indispensible parts of our social culture. But this is not true. Interactive art limps along, subject to logistical and conceptual impediments.

Although many interactive artists have been experimenting with this technology over the past three decades, they have been taxed by the expense of making art with electronic devices and difficulty finding an audience. In the United States, government cultural support is still largely restricted to the traditional art forms. And so far, the electronic industry has offered only modest and occasional support in the form of donated equipment, scholarships or festival sponsorship. Exhibition and performance opportunities are more limited in the U.S. than in Europe, where an interactive visual artist can, for example, work with a major orchestra.

Myron Krueger, the father of artificial reality, is another example. He is known as the founding father of unencumbered virtual reality or non-goggle and glove VR. In 1974 the National Science Foundation refused to give him a grant. Someone in the NSF eduactional department validated this with "You won't get funded because you are creative." Its also diffiicult to believe some con-

ferences and academic presses did not consider his research for publication. Unfortunately it took him 10 or more years to publish his now well known book "Artificial Reality." He started this research in the late sixties, years before the data glove and goggles became a popular topic in the computer graphics world.

Krueger first started working with interactive art in 1969. He collaborated with several artists, musicians, and scientists to produce "Glowflow," a computer program which controlled objects that responded to the viewers behaviors. The artists and scientists he worked with during this time thought the viewer should not be involved with the influence of the computer graphics. Krueger disagreed. He thought the viewers influence with the work was the most important aspect of the art.

Camera VR Authoring Programs

The Mandala program allows you to create your own worlds within the computer. These internal realities or scenes come alive through the interaction or contact with such objects as virtual musical instruments. The Mandala system revolves around an Amiga or PC computer, a digitizer and a video camera. By moving around in front of the camera, you can genlock your body into an altered reality within your monitor. While there you can touch or interact with a variety of interactive objects. The ojects can be animated and/or trigger sampled sounds or MIDI events.

Objects in a scene can be triggered by contact with a person, a mouse or the computer keyboard. It can also control a video disc player.

Another program to consider is the VNS program for the Macintosh computer. It is an interactive software/hardware program that sounds video signals to MAX software by Opcode Inc. David Rokeby is the creator of the VNS, which stands for Very Nervous System. It is a software and hardware combination. The VNS and MAX are wonderful compliments to each other. The two are graphic and music program evironments that were created for people who have reached the limits of the usual sequencer and voicing programs for MIDI euqipment.

You can create applications for composing music, improvision music, providing accompaniment as you play, sending commands to synthesizers, modifying synthesizer patches. MAX turns all control information into a simple stream of numbers. This would allow you to control other equipment, such as a laser disc player in real time. MAX provides you with a high level graphical programming language that takes full advantage of the Macintosh's graphical objects rather than text. This reduces the need to learn arcane commands and syntax, and provides a clear and intuitive approcah to write programs simply by connecting objects to each other. Because of its speed, MAX enables you to write programs which generate music and even quicktime graphics instantly based on what you play. It can also modify your performances as you play.

The Palladium

The Palladium was a converted house which featured art by well known artists. Unlike other similar businesses that open during the 80's, it commissioned artists to make videos for its large video walls. There were 25 monitors in a 5X5 combination that was lowered up and down over the dance floor complimenting the music and the computerized lighting and other night club effects. Some of the art stars that attended these events were Andy Warhol, Keith Haring, Rodney Alan Greenblat, and Basquiat.

The video "Beat Plus One" by Maureen Nappi, was one of the most popular commissions. It was filled with a high energy dance beat that attracted its viewers with its powerful animated abstract images. She was one of the first artists to frequently use professional broadcast tools, which were originally developed to create network flying logos. Nappi applied this technology to her own fine art aesthetic.

The Palladium was a place that gave an electronic art education to anyone who entered the club. It would do what most art museums still attempt to do. That is, make the museum a place

where a person could express themselves through visual art, dance, theater, poetry, happenings and/or performance art.

The Virtual Palladium

My Virtual Palladium is meant to be a space where anyone can acquire electronic art knowledge by walking in a room that is controlled by the presence of his or her body. Each participant has a chance to experience this new frontier by becoming an art object and/or an interactive art/music composer.

My work was installed in the Detroit Institute of Arts in Detroit, Michigan. It allowed participants to become a collaborator, actively making interactive music compositions by using their body as an interface instead of a mouse or keyboard. The room was equipped with a video camera, 3 large video monitors, a sound module, a video processor and a Macintosh computer. Since the input device was a video camera, participants did not have to touch the installation or be physically connected to the equipment. This means a person or persons will be able to walk into the space and not only compose improvised music, but become the musical instrument. At the same time the viewer can choose to accompany my video taped movements or make their own compositions with a virtual flute that was loaded into the Ensoniq EPS 16+ sampler. The computer graphics and music was pre-recorded on super VHS tape. This abstract animated computer graphics was generated in real time using an Amiga 2000 and the Mandala software with a genlock. This allowed my hands and arms to be superimposed onto a computer generated animated background.

An Amiga 4000 with a Video Toaster/Flyer was used to make special non-linear edits and effects. The VNS and MAX programs are controlled by my body via black and white CCD camera. I can then trigger several hyper-instruments and paint with electronic abstract color by moving my body. The more active the body movement, the more expressive the electronic paintings and music becomes. This method of artmaking is constantly the way we envision the future of concerts, dance clubs and performance art.

Conclusion

Like the inventors of all the interactive hypermedia mentioned in my paper, the band D'Cuckoo is never content to sit back and wait for someone else's cue. Candice Pacheco, Jennifer Hruska, Janell Burdell, and Tina Blaine are also pioneers in interactive concerts. The band has been including the audience in the creative process during live performances for several years.

They designed and built their own custom instruments, including MIDI marimbas and a 6 foot bamboo MIDI trigger sticks. The band also created the MIDI ball, a huge, helium filled sphere studded with MIDI triggers and a wireless transmitter. During their performances, the band throws the MIDI ball out into the crowd for the audience to play. As the band plays a riff, the MIDI ball bounces across the audience as if it is a giant, electronic volleyball. Each time a hand, arm or head touches the ball it triggers new sampled sounds and video images. Now, just imagine what the next ten years will bring.

Suggested Reading

Boyle, Deirdre, **Video Classics: A Guide to Video Art and Documentary Tapes**, 1986

Electronic Music Magazine, PO Box 41094, Nashvile, TN 37204
Leonardo, International Journal of the Contemporary Artist, MIT Press

Suggested Videos

Martin, Robert - **The Virtual Palladium**, 1995

Nappi, Maureen - **Beat Plus One**, 1985

Robert Martin
Associate Professor
Department of Art and Art History
Wayne State University
Detroit, MI 48202

Overview to 4/c Process Printing

Richard H. Wright

The exponential growth of desktop technologies in the last several years has released color printing from the proprietary domain of high end/exorbitantly priced dinosaurs in which it traditionally existed. Concurrently, the steep decline in the cost of image input systems (CCD and PMT scanners) has enabled a remarkably broader user base access to publication assembly and design in an unprecedented explosion (the much ballyhooed Desktop Revolution). While the requirements for entry have been lowered, the base theories governing the production of these new works have remained very much traditionally based (with the notable exceptions of waterless printing and stochastic screening) and still rely heavily on techniques essentially unchanged for the last twenty years. It is these "antiquated" theories that need to be understood by the aspiring desktop designer prior to the construction of a job before he/she creates an electronic nightmare that proves to be not only expensive for the printer to rework, but also will probably produce a final product equally disappointing in quality.

First and foremost one must always keep in mind the reproductive medium being used to mass produce the final product. Standard offset lithography (generally sheetfed press) is a common process and used on as wide a basis as any other type of printing. From four color process (combination of four base colors to reproduce continuous tone images) to spot color (use of single or multiple spot colors to print in combination), offset sheetfed printing has a market accessible to almost any budget. The major considerations for sheetfed printing tend to be imposition (arrangement of pages to form a recognizable book if one is attempting to produce a publication), color saturation (amount of ink physically laid down on the paper to transfer an image), screen/line resolution (the number of halftone dots/per square inch to resolve definition in any area not absolutely 100% covered in ink), and trapping (amount of slight overprinting necessary to compensate for inherent misregistration in the sheetfed printing process). If all of these components are not assembled/addressed in construction of the print job, then the final product cannot reach fruition.

Make no mistake, whether or not the desktop designer addresses them or not, these issues will still have to be dealt with. As anyone who has had to have a job printed will tell you, if they are not taken care of in the design stage, then they will be taken care of in printing preparation (and backcharged for as well). One of the more common four color process (hereafter referred to as 4cp) pitfalls is color saturation. In subtractive color theory (the basis for 4cp printing), the presence of all colors equals black, While it a certainty that 100% of all colors in a shadow area will give a black, it is just as certain that the resulting 400% color saturation will not only appear muddy, but will also tend to transfer excess ink to the back of the sheet on top of it in the press run. A good rule of thumb is to avoid color saturations higher than 290-300% (i.e., 75% all four colors). Highlights (areas of an image that are the lightest relative color values) should contain generally no less than 10% total saturation (2.5% of all four if balanced) or they will appear washed out. How to find these values? The info box in Photoshop will provide you with fairly accurate readings. Dot gain at press should be compensated for by our print shop, and if you have realistic values at the start your image should be relatively easy to reproduce at an acceptable cost and quality,

Imposition is primarily a function of the print shop, process, and press it is to be run on, and generally is accepted as the responsibility of the printer who prints the final job. Crossovers (images that "cross-over" two adjoining pages) are difficult to produce for some shops, and some printers recommend not to do these. I myself have had very little problem with crossovers in impositions, so let your own intuition be your guide. In flexography (small web type printing used primarily in producing labels and packaging), crossovers are nonexistent, as they are also for single-up poster type printing.

Trapping is a somewhat thornier issue. Some print shops figure trap time in with your quote, as it is a necessity in all forms of printing except smaller format sublimation (heat transferred from

an offset printed sheet in dyes). Many designers and freelance artists make the fatal mistake of writing somewhere on the paperwork for a job to "output as is", not fully understanding or realizing the necessity for trap, or using a complete overprint as a substitute for true trapping. As there are no true opaque inks for most printing processes (except for certain colors of seriographic inks) this produces an unacceptable third color anywhere the overprint occurs. Trapping is also charged for as system time (if the shop can trap it electronically) or as conventional prep time if it has to be done on the stripping table. Either way is a costly proposition. As it is generally part of my job I say go ahead and send it without traps, because it will just provide me with a guaranteed income. If, however, you do wish to hold costs down, trap yourself wherever possible. A good rule of thumb is .003-.004 inches, with black generally able to overprint a trap up to about .006 inches. For those of you who use Quark Xpress, this works out to .22 points. Generally too you will also want to trap images into areas of solid color ("spreading" the image) rather than trapping solid color into the image ("spreading" the solid). Images (4cp) with built 4c elements may not require trapping as there will be a "bridge" in the process colors, negating the need for actual trapping.

Traps also vary per each printing process. Flexography uses a general trap of .014 inches versus the .003-.004 inches mentioned above for sheetfed offset. Web printers can run a .002 trap due to the stable nature of the paper being traveling through a web press, while screen printers prefer as much trap as they can possibly get (up to .02 inches). Think of trapping every time you overlay elements in a design, and multiply this times dollars.

Another important thing to bear in mind is the color compression that occurs when going from that lovely RGB image displayed on your monitor to the CMYK image that will be required to print the final piece. For those of you in Multimedia/Video, this is not an issue as your work will remain in the 16.7 million additive color spectrum. If you wish to take this to printed piece, however, this 16.7 million will drop to a much smaller 4-5,000 (depending on who you believe in color theory). Fluorescents will not translate into process, and neither will metallics. There are many other "non-transferrable" colors, and if you are in doubt, refer to a Pantone process color build guide. This can give you a good ballpark idea of what is generally possible. A newer printing process using actual fluorescent process colors will give you a brighter image but will not expand your horizons to the RGB spectrum (printers are not noted for their truthfulness, so don't believe them when they tell you that it will).

Even a seemingly innocent single or two color job containing halftone images can contain a multitude of hidden problems. Highlights of less than 3% are not advisable as are shadow areas of greater than 90%. Dot gain compensation will also be needed in most cases, and it would be best to leave this to the print shop as they will (or should) know the limitations of their presses. If you create a duotone in Photoshop, be sure and assign the Pantone colors different screen angles in the page layout program that it outputs from to avoid unwanted interaction between the two colors (referred to as moire). Generally also never assign the yellow angle (90 degrees) to one of these colors.

If you are doing your own scans, try to avoid using too much unsharp masking, While this will tend to make your subjects appear sharper, too much can cause "cabling" or an outline around items within the scan. Likewise, adjusting contrast in the extreme can drop out highlights and darken shadow areas to unacceptable values. Try also to keep neutral areas (grey/off white) neutral. highlights in neutral grey should ideally contain about 6% cyan, 4% magenta, 4% yellow, and discretionary amounts of black (depending on how dark you want the highlights to be). This is referred to as Grey Balance and will prevent an unwanted color cast from creeping into your images. Midtone greys should read around 60% cyan, 40% magenta, 40% yellow, and variable amounts of black (for dark/light adjustment. Shadows, 70% cyan 80% magenta, 80% yellow or some permutation of these same relationships), Too much cyan produces "cool" colors (and deathly fleshtones), and too much magenta produces "warm" colors (and feverish flesh). Too much yellow and subjects appear jaundiced. So a grey balance is very important.

By no means is this a complete course in process printing, I merely mention here the most common things that I see and that I check for in preparing any job or image for printing. Further sources for material would include the Graphic Arts Technical Foundation, who produces a great deal of material on printing theory and technology, and who can also refer you to any number of other sources. Armed with a good base of knowledge, design can be a very exact science made infinitely easier with the newer desktop technologies in such widespread use today.

Cyber Art: An Internet-based Electronic Media Curriculum

Kevin Daniel

Abstract

This paper outlines the development of the internet-based computer art course Cyber Art. It also presents the Cyber Art model as one possible solution to the problem of supporting technology-based curricula and demonstrates how that model has been integrated into the Electronic Intermedia program at the University of Florida.

Introduction

Once upon a time it seemed a much simpler thing to maintain a viable technology-based arts program. The story of the Cyber Art curriculum begins at the point of the collapse of the small home computer industry whose products were at the core of many computer art programs.

In 1991 I was faced with a number of very specific problems: An aging Amiga-based studio, an increased demand for computer studio resources, and a complete lack of cash reserves for upgrade and expansion. Aggravating that particular condition were questions as to the long term viability of the Amiga product line and debate as to the direction of the hardware development of the studio. The questions we were faced with at Rensselaer Polytechnic Institute, where I was teaching then, really turned out to be the recurring themes of a program whose roots are in high technology.

Today at the University of Florida we are faced with an almost identical dilemma except the aging Amigas are aging Macintosh II class machines. The problem is the same, we have hit the end of a product life cycle, are short of funds, and must now make a decision about how to proceed.

The Hardware Impetus

At Rensselaer it was our good fortune that at the same time the Department of the Arts was struggling with the future of it's computing efforts, the Institute's administration had decided to phase out the operation of it's mainframe and replace it with over 200 networked, Unix-based, graphics-capable, engineering workstations.

The new machines were divided among a number of classrooms each containing 30 student workstations and one machine for the instructor, and a number of public access facilities some of which were housed in the student dormitories. This seemed like a fairly hospitable hardware solution except for the fact that no provision had been made for the input or output of images except for a number of black and white laser printers scattered around campus.

The lack of readily available i/o resources provided part of the motivation for the development on the Cyber Art curriculum. Without input devices such as scanners or other digitizing hardware, there was an increased importance placed on having access to on-line image resources. Likewise the limited output options favored screen and internet presentation of complete works.

The Software Impetus

A primary motivation for the development of Cyber Art was to solve the rather significant software problem which resulted from the shift to the centrally managed computing facility.

Part of the compromise of using equipment maintained by another department was the loss of absolute control over what software could be purchased and installed. Software is expensive, Unix versions of popular software are very expensive, and site licensing of software for 200 machines was more expensive than anyone could absorb.

The solution was to attempt to rebuild the curriculum around the use of software in the public domain, freeware, and shareware. The first course I taught based on freeware was an adaptation

of a sophomore level 2D animation course called Computer Imaging.

Computer Imaging: Unix, was based primarily around two applications, an image viewing and manipulation package with an extremely limited image editing capability called XV, and the Utah Raster Toolkit, a collection of small image processing and display programs with a text-based interface. Raw images for use in student projects were gathered from internet-based image archives such as wuarchive operated by Washing University in St. Louis.

The initial efforts at teaching with these resources were not ideal due to a number of problems utilizing some of the software not originally designed as artist's tools, but after a few weeks learning the basic behavioral glitches of the system, the students were able to produce some fairly interesting work.

Eventually a shareware equivalent was found for most of the software we had used on the Amigas, and as a result of the intimate relationship between the tools and the internet, I decided to try and foster a more direct link between the art and the internet.

The introduction of the software NCSA Mosaic, a World Wide Web browser, and the installation of WWW server software, made possible the transition to a completely internet-based art production strategy.

Cyber Art v. 1.0

The original group of students in the new course Cyber Art had already been subjected to the relatively harsh Unix operating environment and to the quirks of the various freeware tools in the course Computer Imaging: Unix. Having a group that was already very familiar with the tools was essential to this first offering as I was able to set them loose to explore the creative possibilities the net in the fullest possible way.

After spending a few weeks learning Hyper Text Markup Language (HTML) and constructing individual WWW home pages the students were asked to design a number of projects that took full advantage of the existing tools and any others they could ferret out from the network. The class eventually split into three project groups: one working on an image-based WWW virtual environment, one attempting to present near-live video on a web page, and one developing a large scale hypertext project.

The virtual environment group used a combination of freeware 3D rendering software and the image map feature of HTML to build a digital space. Each student in the group was responsible for either creating the visual component of the space or scripting the response of the space to user interaction. The final project could be navigated by clicking a mouse on certain features of an image which would take the user to either another part of the space or to a WWW site with information related to that object.

The video group was able to convince an equipment manufacturer to loan them a video digitizer and spent the semester developing various schemes to get it to work with the workstations, which it did only on occasion.

The hypertext group worked on the production of a WWW prototype of a publication titled Not the Rensselaer Student Handbook, complete with links to other campus resources already represented on the World Wide Web.

With the exception of the video group, whose hardware problems would have taken longer than a semester to solve, the students were able to bring their projects to fruition. They also demonstrated that given the ability to gather other tools that they would find or invent what they needed to accomplish their goals.

The Migration of Cyber Art

From the evolution of Cyber Art I took a number of lessons which I have used in the development of the Electronic Intermedia program: That it is increasingly difficult to find money for single use computing facilities, that it is possible to provide a rich computer art experience through

the use of free software, and that although freeware is often ornery to use, that this actually has the side benefit of producing students that are more facile with the commercially available tools and who can more easily obtain the means of production after graduation.

Network connectivity proved to be most useful in the development of some of these strategies although it is not essential as much of the available shareware is now available on CD-ROM for a variety of platforms.

In the migration of the ideas from Cyber Art to the computer art aspects of the Intermedia program however the connectivity issues were central.

The Electronic Intermedia Program

The Intermedia program follows the general model of using freeware in a network environment. As with the situation at Rensselaer, the program at the University of Florida is experiencing a shift from an aging departmentally managed computer art studio to a facility controlled by a university-wide computing administration.

Many of the issues that I encountered at Rensselaer have also been reflected in the changes we are experiencing at the University of Florida. In some ways however we are in a much better situation. The departmental facility was Macintosh equipped as are the new centrally managed classrooms. This has been significant as we can continue to use the input and output devices in the older studio and still take advantage of the improved hardware in the new. The similarity of the hardware also means that most of the free software resources are portable between classrooms, eliminating the need for finding compatible programs for differing platforms. The World Wide Web solution was not as integrated however and required that a separate machine be set up as a web server.

Integration of the ideas taken from Cyber Art into the overall curriculum was also simplified because I was working from the notion of using certain classes of software versus specific brand name applications. For example paint, draw, and hypertext software instead of Photoshop, Freehand, and Hypercard. I have also been able to set up a progression of courses which lead to the fluid use of the internet as an artistic tool.

Computer Art is the first course in the sequence and is essentially a digital media sampler course. Students work with a number of programs to explore the still image, animation, sound, and hypermedia. Projects are structured so that each individual project will become a component of a later one.

Computer Art: Animation and Interactivity is the mid-level course. Students become involved with more advanced 2D animation projects and begin building WWW documents.

Computer Art: Advanced Projects is the final course in the sequence and results in a public show of student work. This course is very student directed so the specific tools used drift according to the needs of the individual projects.

Conclusion

As more digital art programs are put in the position of having to rebuild their facilities and upgrade their software resources, the strategies which led to the evolution of Cyber Art can be an alternative to having to plan for the next generational shift in the technology.

The centralization of resources although not an ideal situation because of the removal of direct control over the hardware, does also share the cost of continual upgrade and maintenance.

The primary or partial use of freeware or shareware has the disadvantages of not giving the students experience with brand name software, and many programs lack any kind of sophisticated technical support. I believe however that the freedom that comes from not being financially committed to one particular solution, and the ability of the students to legally take the software with them, serves to balance these issues.

Finally I will admit to a certain fondness for physical output which is currently absent in the student's network based art. I am pleased however with the degree of flexibility they have discovered in working over the network and with the idea that their work is always on public display.

Appendix

Tools

University of Michigan Software Archives
http://www.umich.edu/~archive

Wuarchive
ftp://wuarchive.wustl.edu

Art Links

Fine Art Forum
http://www.msstate.edu/Fineart_Online/index.html

OTIS
http://sunsite.unc.edu/otis/otis.html

ISEA
http://www.xs4all.nl/~isea

Leonardo
http://www-mitpress.mit.edu/Leonardo/home.html Leonardo

Electronic Intermedia
http://intermedia.arts.ufl.edu

HTML Tools

A Beginner's Guide to HTML
http://www.ncsa.uiuc.edu/demoweb/html-primer.html

Composing Good HTML
http://www.willamette.edu/html-composition/strict-html-single.html

Asst. Professor Kevin Daniel
Area Coordinator Electronic Intermedia
Department of Art
University of Florida

"Spider Woman on the World Wide Web?

Alternative Visions of Women in Cyberspace" a slide lecture to be presented at SCAN '95

Susan Ressler

ABSTRACT:

This paper is concerned with a cultural critique of gender role stereotypes in cyberspace. It is a slide-lecture which presents images of cybered bodies culled from historical and vernacular sources in art, advertising, and the media. It investigates and correlates ideas about technology and power which have a long history in Western culture, and illustrates that despite sweeping changes in technology, we are repeating old paradigms. The author suggests that an alternative and liberatory vision of cyberspace is both necessary and viable, and is available to us, in the mythopoesis of our pre-scientific past.

DESCRIPTION:

This paper is concerned with a cultural critique of gender role stereotypes in cyberspace. The slide images present an historical overview of the development of gendered images of cyberspace, in order to contextualize a brief discussion of my digital artwork and suggest an alternative (and more egalitarian) future vision.

I begin with a selection of contemporary advertisements, in order to demonstrate that the current imaginary paints "Technology" in the classic guise of power over, and in opposition to, "Nature." We are the inheritors of a value system that pits "Culture" (physically manifested as "Technology") against "Nature," science against art, and men against women; a system that supposes that human beings attain mastery by dominating and controlling to maintain existing hierarchies and power relations. In this scenario, "Technology" is metaphorically portrayed as a male warrior, and "Nature" is submissive, female, and symbolized by the earth.

Plenty of evidence exists to identify the current shape and historical roots of this paradigm. Carolyn Merchant in Radical Ecology, for example, traces the origins of our mechanistic and patriarchal worldview back to the 17th century and Francis Bacon's advocacy of "the domination of nature for human benefit," explaining that when Bacon speaks of "Nature's womb," of "digging further and further into the mine of natural knowledge," that "Nature" should be "squeezed and molded" and so on, that this "bold sexual imagery" constructs notions of gender and power that are still with us today.

I look at images from the 1920's and 30's in European avant-garde photography (such as El Lissitzky, Moholy-Nagy, Hannah Hoch, Alexander Rodchenko, etc.) to review how these notions continued to be reified as gender role stereotypes, now imbued with technological motifs. Comparisons are made to images from our own era, to the "post-human" and cyber projections of dematerialized (virtual) and robotic analogues for flesh and blood, still modeled on these former (but tenaciously present) patriarchal conceptions.

For example, why does a current advertisement for an Eclipse Fax machine depict a female as passive cyborg? The caption reads: "If it were any faster, you'd have to send and receive your faxes internally" and the picture shows a woman with electronic cables protruding in and out of every facial orifice. She swallows the technology, and the implication is that the hand who feeds her is that of the corporate male, whose message is being transmitted (faxed).

Similarly, El Lissitzky's "Artist as engineer" photo-collage from the 20's conflates the human and technological, but this time the artist's hand is male. In "The Constructor," the image is replete with hand - tool - eye collaged as one, and the male artist is positioned as actor - maker - constructor. And so on, the pattern repeats, from the 20's and 30's and into our own times. Virtual worlds and cyberfantasies continue, for the most part, to reflect (and perpetuate) these sex

role stereotypes.

There are exceptions and alternatives, fortunately. The second half of this paper explores such options, utilizing the myth of the Spider Woman to exemplify what Riane Eisler (in The Chalice and the Blade) calls a "partnership" rather than "dominator" model (paradigm) for the future.

The spider is an apt metaphor for the creative potentials inherent in cyberspace. In traditional myth (as in Oklahoma Plains Indian creation stories) the female spider is the weaver of life. She is depicted with two heads and multiple limbs (reminiscent of Shiva, as well as other spiritual connections, in the Jungian archetypal sense), and she nests within a circular, egg-shaped web.

The web is, of course, in common parlance, a reference to the internet. Nets and webs can be a model of egalitarian, non gender-specific interactivity. Spider Woman herself has a high tech reincarnation, as the "wonder woman" with miraculous powers who roamed the sci-fi comix of yore. In that inception, she gained superhuman status by mutation, as few know her birth was altered by proximity to a toxic waste dump. In this myth, the technology's poisons are transmuted so that new life can heal the planet.

This paper concludes with examples of my own digitally produced images, from a series entitled the "Spider Woman" cycle. Using self-portraits, this work in progress (ongoing since the mid-80's), uses digital technology to create images that are about the search for a new, earth-centered, paradigm.

I believe that binary technologies do not have to create binary oppositions (in culture and communication). My aesthetic statement reads:

The computer is a transformative tool—I use it to shape, sculpt, paint and collage photographs—until they metamorphose into poignant symbols that touch us deeply.

My work is about healing—the self, society, the earth—and that involves celebration, as well as exorcising shame.

I think of Joanna Macy's book, World as Lover, World as Self, and correspondingly, I speak of a personal ecology of the spirit. I feel we need a new alchemy, a new paradigm, a new approach to technology: one that enhances life, instead of destroying it.

I have chosen poetry as my politics—to feel is the first step towards change.*

*To see examples of my artwork, you may refer to the following publications:

1993

Art of the Electronic Age, by Frank Popper
Abrams, New York
(see p. 79 for reproduction & statement)
School Arts Magazine, March, 1993
The Challenge of Computers in Art,
by Professor Kenneth O'Connell
(see pp. 14 - 17 for reproduction & article)

1991

TEN.8, Vol. 2, No. 2
Birmingham, England
Special Issue entitled *Digital Dialogues.*
(see p. 105 for reproduction & statement)

Leonardo, Vol. 23, No. 4
Pergamon Press, Oxford, England
The Transcendental Machine? A Comparison of Digital Photography and Nineteenth Century Modes of Photographic Representation, by
Diana Emery Hulick
(see pp. 419 - 425 for article & reproductions)

Computers in Art and Design
Exhibition Catalog
SIGGRAPH 91 Art and Design Show
July - August, Las Vegas, Nevada

Susan Ressler,
Associate Professor
Department of Visual & Performing Arts
Purdue University

Grids, Guys and Gals: Are you oppressed by the Cartesian Coordinate System?

Greg Garvey

Portions of this article are taken in part or in whole from the Proceedings of SIGGRAPH '95, (Los Angeles, CA, August 6-11, 1995). In Computer Graphics Proceedings, Annual Conference Series, 1995, ACM SIGGRAPH, pp. 503-505.

PANEL :

This discussion addresses the very real and palpable issues of gender differences regarding computer technology in general and computer graphics in particular. At SIGGRAPH'93 during the NANOSEX Panel, Joan Staveley, computer graphic artist, animator and agent provocateur, first made the following remark which best captures the issues at hand: "The Cartesian Coordinate System is cold, sterile, oppressive to women, and was invented by a dead white European male!"[1]

The response to Joan's statement at that time was dumbfounded silence which is not surprising since SIGGRAPH is a conference attended by a community of scientists, engineers, and commercial vendors of computer graphics technology. Why are most enthusiasts for VR and Telepresence boys? Will it make a difference when women try their hand at designing the virtual worlds of fake space? Why is Tetris preferred by most women over other video games? As Ellen Spertus at MIT has asked "Why are there so few women computer scientists?" Answers to such questions are no means definitive.

The statement that the Cartesian Coordinate System is oppressive refers directly to the constraints and limitations of the tools. It is through such criticism that better models of the user interface can be developed. Contributors to this discussion have indicated that research points to measurable gender differences involving spatial representation and links to cognition that may well contribute to the formation of social and cultural norms. Brenda Laurel[2], artist, author, and Researcher at Interval Research in Palo Alto, California has previously commented: "How space is represented in art, science, religion, and other cultural domains reveals much about the nature of a culture and transmits a variety of loaded understandings to its individual members. In turn, differences in experience and interpretation among individuals and subcultural groups reciprocally influence the larger cultural constructions of spatiality as both metaphor and practice. How we shape and employ spatial representations, metaphors and narratives in the construction of interactive media has enormous influence on who will experience our work, how it will be integrated and interpreted, and what its political ramifications might be. These considerations are especially relevant as regards both cultural and biological aspects of gender."

Rob Tow a research scientist at Interval Research adds:[3] "There are many representations of spatial relationships in human culture, art, and science, both now and through history. All are abstracted tools of knowing embedded in particular situations, and all work better for some people than for others. Rectilinear coordinate systems, and their close cousin Renaissance perspective, are examples. Recognizing these differences, we should NOT strive for the mediocre ideal of some sort of androgyny of geometry, but must instead build instrumentalities and interfaces that are richly multimodal in the way they empower people who are differently endowed."

Much can be gained by challenging and questioning certain assumptions, examining and critiquing gendered constructions of space and interface and proposing alternatives (a feminist computer?, non-Euclidean computer graphics?).

In a paper entitled "New perspectives in Computer Graphics," Veronique Bourgoin and Marc Roelens of the Ecole Nationale Supérieure des Mines de Saint-Etienne, France have proposed that computer graphics incorporate new concepts of 'realism' taken from Cubism. Cubism uses another

kind of realism where a single picture contains views from several viewpoints, "like two eyes looking at something." Such explorations suggest there are valid alternatives to the straightforward mappings of the cartesian coordinate system or simple transformations such as with polar coordinates.

Issues of gender and technology linked to a discussion of identity and subjectivity are no longer seen as irrelevant to such practical concerns as the design of the user interface, input devices and visualization tools. The recent artistic work of several women demonstrate the impact of this change in outlook. OSMOSE is an immersive Virtual Reality work by Montreal based artist Char Davies, supported by SOFTIMAGE-Microsoft that confronts the limitations of Cartesian Rationalism. Davies, formerly a painter, "deliberately circumvents the Cartesian coordinate system (i.e. static, solid, hard-edged objects in empty space) to create spatially-complex and ambiguous relationships whereby distinctions between figure and ground, interior and exterior are dissolved. Similarly, the project's interactive aesthetic seeks to subvert the Cartesian privileging of mind over matter by grounding the immersive experience in the participant's own interior bodily processes thereby re-affirming the presence of the body in virtual space.[4]" This is done by the use of breathing as input for the user interface. Inhalation and exhalation control up and down motion in this virtual realm. "In addition, interaction is designed to transcend the Cartesian dualism of subject and object by emphasizing mutual inter-relationship between self and "others", and encouraging behavior based on gentleness and sensitivity rather than domination and control."

Can technology allow us to share subjectivities and be used to pry open new viewports to the previously invisible, inaccessible and private domains of sensation, emotion and thought? New concepts of interface design have resulted from the collision of subjectivity, corporeality and technology and the socio-political discourses arising from the dematerialization and virtualization of the body. Finish artist Heidi Tikki proposes the surface of "a Hysterical Body-A concept for Interface."

She criticizes current interface technology "for being capable of producing a masculine subjectivity only. This feminist critique was directed towards the dominating role of vision and particularly the Cartesian visual space as the foundation of the interface design." She proposes..."a parallel concept for the masculine interface, the feminine inter-skin. However if we abandon the concept of the Cartesian subject as the foundation of the interface design, what remains? The physiological body is the object of the Cartesian knowledge as well. The feminine requires a new concept of the body. In psychoanalysis we see another kind of body emerge, namely the body of a hysteric. The hysterical body is a pleasure body traversed by the signifying process of desire. It is a rimlike structure, a boundary surface in which language and physiological processes intertwine. As a boundary structure it will provide us with a new concept of the body for the new interface technology."[5]

These artists dare to suggest there are shortcomings to Cartesian rationalism. However it would be a mistake to reject such views as belonging to 20th century luddites. Women artists are demanding more of the tools and in doing so reveal the barriers and biases that are only reluctantly acknowledged in what was a previously male dominated field.

Many of the women and men who utilize computer technology are legitimately engaged in a critical appraisal of their role in the technological and scientific order and this appraisal reflects the will to transform and remake technology that is responsive to the full range of human capabilities, limitations, needs and desires. The near future promises a continuing transformation of the field as women increasingly play a more prominent role.

Studies such as the January issue of the Communications of the ACM (WOMEN in Computing, Edited by Amy Pearl: Communications of the ACM January 1995/Vol. 38, No. 1) has shown that the "silicon ceiling" is real. The abstract from Ellen Spertus's article "Why Are There So Few Female Computer Scientists?" (MIT AI lab Technical Report 1315, August 1991, 112 pages, or http://www.ai.mit.edu/people/ellens/Gender/pap/pap.html) summarizes these issues: "This report examines why women pursue careers in computer science and related fields far less fre-

quently than men do. In 1990, only 13% of PDS in computer science went to women, and only 7.8% of computer science professors were female. Causes include the different ways in which boys and girls are raised, the stereotypes of female engineers, subtle biases that females face, problems resulting from working in predominantly male environments, and sexual biases in language. A theme of the report is that women's underrepresentation is not primarily due to direct discrimination but to subconscious behavior that perpetuates the status quo."

There is an ongoing debate in the classroom, academic journals, and the popular press regarding significant differences between men and women especially in learning, using, and designing technology which takes place against the backdrop of a more general invocation of "cultural studies." One might hear the view that the edifice of western science and technology is but only a constructed artifact of the dominant white male patriarchy driven by the imperatives of expansionist monopoly capitalism.

Examining such a view in some detail reveals how moral and ethical concerns are extracted from a seemingly innocent and innocuous coordinate system. The Cartesian Co-ordinate System is seen to be a construct that paves over, subdues and silences the natural but raucous, unruly, diversity of the world with the steamroller of reason. The Panoptic Cartesian Grid extended by projective geometry casts its net of domination over all that is observed, surveyed and measured. The convention of perspective at the service of the male gaze is a phallic instrument that penetrates the visible world of nature. Today many of us, male and female alike would recoil from the words of Francis Bacon, a white male and father of the enlightenment when he recommends that nature(female) is to be "hounded in her wanderings," "put into constraint," "bound into service," and made a "slave."[6]

Despite claims of objectivity, modern science is apparently not so innocent. In "The Science Question in Feminism," Sandra Harding[7] writes: "science today serves primarily regressive social tendencies; and that the social structure of science, many of its applications and technologies, its modes of defining research problems and designing experiments, its ways of constructing and conferring meanings are not only sexist but also racist, classist, and culturally coercive."

Similar lines of argument assert that the rise of modern science founded on domination and possession is coupled with the development of capital and private property. From this perspective Descartes' Coordinate System is seen as a tool that merely facilitated for example mapping the globe at the service of colonial exploitation. In diametric opposition may be views of the scientist, engineer, designer or artist who see the Cartesian grid as a gender neutral tool essential to computer graphics in any form.

Marshall McLuhan puts the blame on Gutenburg: "The same Gutenburg fact of uniform, continuous, and indefinitely repeatable bits inspired also the related concept of the infinitesimal calculus, by which it became possible to translate any kind of tricky space into the straight the flat the uniform and the 'rational.' This concept of infinity was not imposed upon us by logic. It was a gift of Gutenburg. So, also later on, was the industrial assembly line. The power to translate knowledge into mechanical production by the breaking up of any process into fragmented aspects to be place in a lineal sequence, yet uniform, parts was the formal essence of the printing press."[8] McLuhan continues by connecting Gutenburg to the exploitation of both humans, animals and the environment that follows from the admonitions of Bacon: "The breaking up of every kind of experience into uniform units in order to produce faster action and change of form (applied knowledge) has been the secret of western power over man and nature alike."[9]

We should give credit where credit is due because one of Descartes' primary contributions is his analytical method of breaking a problem down into pieces and putting them into a logical order. This method is at the service of the familiar imperative of the enlightenment project: the domination and transformation of chaotic nature by reason. The opposition of man alienated from nature also happens to be the classic Marxist dialectic û Man must appropriate and dominate nature through analysis and praxis in order to realize his humanness. This inevitably leads to moral judgement and revolutionary self righteousness.

From a completely different direction John Ralston Saul in his turgid sweeping indictment, "Voltaire's Bastards" convicts the enlightenment faith in unbridled rationalism by condemning it for training a generation of amoral, irresponsible, and all too often destructive rational elites.[10] At this point it may be appropriate to heed Foucault's admonishment: "In any case, I think that, just as we must free ourselves from the intellectual blackmail of 'being for or against the Enlightenment,' we must escape from the historical and moral confusionism that mixes the theme of humanism with the question of the Enlightenment."[11]

Descartes' search for a method of analytical doubt led to his partition of mind and matter. God Himself is seen to have created nature as a mathematical machine and was the necessary source of the light of reason that enabled the human mind to perceive this order. The 19th century mathematician Leopold Kronechker held to this with the declaration that "God made the integers; all else is the work of man."[12]

Yet God's position as the guarantor of reason was not eternal. The reductionism of Descartes drove Bertrand Russell to this inevitable conclusion: "I shared with Frege a belief in the Platonic reality of numbers which, in my imagination, peopled the timeless realm of Being. It was a comforting faith, which I later abandoned with regret. In the end it seemed to result that none of the raw material of the world has smooth logical properties, but that whatever appears to have such properties is constructed artificially in order to half them."[13] Russell clearly acknowledges that the net of reason constructs its own artificial reality by attempting to ensnare the natural world. Even Albert Einstein remarked that the integers are "obviously an invention of the Human Mind, a self-created tool which simplifies the ordering of certain sensory experience." [14] So in other words û it's all an artificial reality.

But as Chomsky might ask: "Who benefits?" The answer to this question may be found in the artificiality of internet cross dressing or gender/identity aliasing. Kevin Kelly points out the peculiar phenomenon of gender bias of player's of on-line interactive games. "So many female presenting characters are actually males." "Players now assume all players to be male unless proven otherwise. This has led to a weird prejudice against true female players who are subject to the harassment of proving their gender."[15] It is not irrelevant to note that Alan Turing anticipated this contemporary gender clash on the net with his imitation game û the so-called Turing Test for artificial intelligence where: "The object of the game for the interrogator is to determine which of the other two is the man and which is the woman."[16]

In her article "The Men's Club Is Now Closed" available through Gopher, Stacy Horn writes passionately on what it's like for a woman on-line. Some relevant excerpts follow:

"There are gender differences on the net, of course, regardless of the proliferation of bad metaphors. The on-line world is often touted as a bodiless medium. As The New Yorker magazine put it, in a drawing of a dog typing at a computer: On the Internet no one knows you're a dog. Nonsense. The illusion of free and unbiased communication can only be maintained, and then only briefly, as long as people hide. It's a trick. If no one knows you are a woman, until that is discovered then you will not be treated like a woman. The only way to be treated equally is by going under cover? No, thanks. I want to be in your face, I don't want to be a man on-line or otherwise."

Is the men's club sustained by a grid of innate and/or learned behavioral norms? Do male occipital lobes incorporate a wetware coding of the ready-to-wear Cartesian coordinate system maintained by a steady influx of testosterone? As the Wall Street Journal reports is the popularity of Tetris among women explicable by a drive for (Cartesian?) order based on the nesting instinct and rewarded with a flood of endorphins? Is it the case that (male?) metaphors such as the electronic frontier or information superhighway simply do not capture the true nature of the on-line experience?

Stacy Horn suggests "the word 'infra-structure' invokes the idea of a web or a tapestry, a metaphor which allows for infinite color, texture and variety." Ada Lovelace, mathematician and daughter of Lord Byron is credited as history's first programmer for Charles Babbage's analytical engine of punched cards. If the Jacquard Loom is seen as the progenitor of mechanical computa-

tion marking the beginning of the age of computing, could not La Dentellerie or lace making be a more apt metaphor for the net? Was weaving itself û a women's task, the unacknowledged inspiration for Descartes' grid'?

British philosopher Sadie Plant argues that weaving has been at the center of technological developments and provides powerful interpretive metaphors for models of the mind as evidenced by contemporary neural net research. She cites Freud as having made reference to the brain as a "weaving factory." Plant has criticized Freud's denigration of weaving as women's sole contribution to the history of "invention and civilization." She very cleverly uses his suggestion that the growth of pubic hair, which in sticking to the skin becomes matted and woven in an "attempt to conceal women's shame of genital deficiency" represents a continuity of the body with weaving. For Plant weaving and digitization represents a double movement of increasing simplicity and simultaneously increasing complexity û from the gathering of thread, spinning, platting and weaving versus the underlying representation of all computer codes from assembly programming language to complex World Wide Web transactions.

Chicago based artist Ingrid Bachman in collaboration with Barbara Layne of Concordia University in Montreal are making tangible reality of the metaphor of weaving and the connectivity of the World Wide Web with their new work "Faultlines." Seismographic data from sites from around the world is fed directly as input into a computerized loom.

If women can be said to weave connections with others through technology then male artists are guilty of techno-fetishism that drives people apart. This male disorder leads to techno-tribalism of techno-gardism. The makers of electronic art suffer from the unrelieved competition of technological one-upmanship that masquerades as avant-gardism. In the face of continuous leaps in technology male digital artists seem especially prone to such deviant conditions as pixel envy, hard drive inadequacy, the CPU territorial imperative, premature exhibitionism, and recidivist high tech onanism.

While the truly avant-garde induces a grand mal in the established order, the techno-garde impostor brandishing the cutting edge substitutes intimidation and a misdirected adolescent desire to shock, and is unwittingly at the service of a rear-garde, uncritical modernist faith in the progress of technology inherited from the rationalist program of the enlightenment. For Voltaire's Bastards, rationalism reified through techno toys becomes both bludgeon, bulwark, and bootstrap to superiority and domination. Like Clement Greenberg's merciless doctrine of the integrity of the picture plane for an earlier generation techno-fetishism today also draws a line declaring who's in or out. Feminist reading of psychoanalytic object-relations theory (Jane Hax) suggests that this syndrome is symptomatic of a deeper pathology of male developmental psychology and explains the inevitability of Techno-tribalism, where one man's AMIGA is becomes is another man's club.Sandra Harding describes the Freudian object relations analysis thus:

"For men more than women, the self remains frozen in a defensive infantile need to dominate and/or repress others in order to retain its individual identity. In cultures where primary child care is assigned exclusively to women, male infants will develop unresolvable dilemmas concerning the separation of the infantile self from its first "other" and the establishment of individual identity."

"These are the very same distinctively masculine dilemmas the preoccupy Western philosophers in whose work they appear as 'the Human dilemma'.[17]"

If male artists manage to escape these dilemmas of identity there stills waits another affront and threat. David Harvey[18] suggests that the postmodernist "preoccupation with the fragmentation and instability of language and discourses" is a challenge to the conception of personality and selfhood. Schizophrenia is seen as an inevitable result of the breakdown of the signifying chain of meaning, where the self looses the ability to "unify past, present, and future" into a coherent sentence and similarly looses the ability to form a coherent notion of self. Harvey cites Deleuze and Guattari who link schizophrenia to capitalism and by declaring in Anti-Oedipus, "our society produces schizos the same way it produces Prell shampoo or Ford cars, the only difference being that

the schizos are not saleable."[19]

This strain of postmodernism thought destroys the classic Marxist conception of the alienated individual: "to be alienated presupposes a coherent rather than a fragmented sense of self from which to be alienated." A sense of identity is further eroded in the encounter with technology especially the on-line experience. As discussed above gender is suspect on the net, aliases are the norm, and self-invention, virtual representation and potential duplicity are the natural artifacts of interaction in the matrix. The male artist is caught in an unresolvable alienation, conflict and competition with an imagined virtual other. "If, as Marx insisted, it takes the alienated individual to pursue the Enlightenment project with a tenacity and coherence sufficient to bring us to some better future, then loss of the alienated subject would seem to preclude the conscious construction of alternative social futures."[20]

Is the unexamined drive to use the latest in technology and equate it avant-gardism an outcome of a desire to construct a second self in opposition to this imprinted other? McLuhan warned that techno fetishism inevitably leads to the mimetic impulse of narcissism. Can we afford to stare into the mirror while ignoring the decidedly un-avant-garde imperatives of social decay and environmental disaster? Yet in spite of the rants, raves, and the loss of the thread of meaning through a welter of deconstructed text, the seemingly neutered grid remains indifferent, implacable and maintains a periodic refresh and panoptic sway over mind and raster graphics.

Submitted by:
Home:
Greg Garvey
2213 Hampton Avenue
Department of Design Art, VA 265
Montreal, Quebec H4A 2KS
Concordia University
Canada
1455 de Maisonneuve Blvd. West
514.484.2946

Home
Montréal, Québec H3G 1M8 Canada
email: ggarvey@vax2.concordia.ca
514.848A626
Messages 514.848.4749
Office 514.848.8627 FAX

[1]*As told to the author.*
[2]*Garvey, Greg, Grids, Guys, and Gals: Are you oppressed by the Cartesian Coordinate System , SIGGRAPH'95 Conference Proceedings, Reading, MA, Addison-Wesley, p. 29*
[3]*Ibid*
[4] *Ibid*
[5] *Submission to ISEA'95 Montréal, Québec.*
[6]*Quoted by Fritjof Capra, The Turing Point, New York, A Bantam Book, (1982), p. 56*
[7]*Harding, Sandra, The Science Question in Feminism, Cornell University Press, Ithaca and London, 1986, p. 9*
[8]*McLuhan, Marshall, Understanding Media-The Extensions of Man, A Mentor Book, New York, 1964, p. 112*
[9]*McLuhan, Marshall, Understanding Media-The Extensions of Man, p. 88*
[10]*Saul, John Ralston, Voltaire's Bastards, Toronto, London, New York, etc, 1992 Rabinow, Paul, The*

Foucault Reader, Panopticism (from Truth and Method)., Pantheon Books, New York, 1984, p.45

[11]*Quoted by George Johnson in the New York Times, The Week in Review, 1994*

[13]*Russell, Bertrand, Principles of Mathematics, New York, W. W. Norton & Company, (Originally published 1903 revised in 1938), p. XI*

[14]*Quoted by George Johnson in the New York Times*

[15]*Kelly, Kevin, Out of Control-The Rise of Neo-Biological Civilization, Addison Wesley, Redding, MA, 1994.*

[16]*Turing, Alan, Mind-A Quarterly Review of Psychology and Philosophy, Vol. LIX. No. 236., Oct. 1950.*

[17]*Harding, Sandra, The Science Question in Feminism, Cornell University Press, Ithaca and London, 1986, p. 152*

[18] *Harvey, David, The Condition of Postmodernity, Basil Blackwell, In. Cambridge, Massachusetts, 1989, p. 53*

[19]*Ibid. p. 53.*

[20]*Ibid. p.54*

The Case for Quantitative Art History

Judson Rosebush

Art and the "analysis" of art has classically been a qualitative discipline—the art has largely been described with subjective terms: "the weight of the line," "the relationship between the figure and ground." "The vibrancy of the color," ans so on. While this language is certainly descriptive it is by no means quantitative. By quantitative we mean the process of applying the measurement with a metric to it. To say that a person is tall is a qualitative description. To say that a person is tall is a qualitative description. To say that the height of a person is 6'3" is a quantitative description.

The problem with qualitative descriptions is that they cannot be subjected to a rigorous analysis. Astronomy, chemistry, medicine, physics and biology all evolved from qualitative to quantitative descriptions during their golden eras, and even the softer sciences like psychology, sociology, history and language have made great strides in this direction. The study of art, regrettably, remains in the dark ages, burdened by an intellectual dilettantism that evokes a specialized qualitative vocabulary which, although certainly descriptive, fails to enable an analysis which is repeatable, measurable, and specific.

For it is analysis that a "science" of art history is about. The transition from a qualitative to a quantitative study requires that variables be discovered or defined which are unique to the subject at hand. These variables are measured, theories are constructed and tested, and ultimately conclusions are drawn. For example, in the study of written language words may be categorized by length in the number of letters, by the number of syllables, and then, once this is done, theories may be constructed and tested which correlate, for example, comprehension of writing with the average word length. Chemistry utilizes a vocabulary of elements of varying weight and valence, which allows chemists to not only break down an object's composition, but to predict what the results would be if various elements are combined together.

It is now time for art critics and historians to learn how to supplement the qualitative approach. The turning point in this endeavor is the development of the computer, which allows artworks of all types to be digitized and represented as numerical entities. This numerical representation can take many different forms, be it descriptions of lines (vectors), areas (pixels), volumes (voxels), velocities, or rates of change (accelerations). Numerical representation applies to all types of art: drawing, painting, architecture, dance, cinema, animation. The digital process has special importance in the visual arts because it provides a powerful tool to analyze pictures and architecture in a qualitative manner, not simply with verbal descriptions.

It is not the purpose of this paper to detail these methods, rather we seek to encourage a new generation to research our visual heritage. Rudimentary methods include a rich set of tools used in image analysis, artificial vision, and mathematics. Here are some hypotheses that could be tested: That a painting can be determined to be Renaissance or Baroque (using frequency analysis to determine if the painting is dominated by simpler bold shapes or is more busy and ornate). Assuming one can develop a measurement of Baroque. Baroque occurred at a uniform rate or in a short burst of activity (a question not unlike one addressed by evolutionary biologists, who argue whether species evolve over long periods of time or change suddenly). In other research it may be possible to analyze a painting and determine if it is painted by a certain artist, or analyze a painting and determine if it is painted by a certain artist, or analyze certain "schools" and discover mathematical clusters which separate and distinguish them from other "schools" (possibly using fuzzy logic or pattern matching). It may be possible to develop variables that enable one to portray the evolution of a painter's work over time, for example a measure of "angularity" may be meaningful in a study of Picasso, a measure of "uniformity of color area" in abstract expressionists. Ultimately, quantitative analysis seeks to make discoveries about relationships in art and those in other human and physical endeavors. For example, what is there to be discovered about

moments in history and ideas in art? Or is it possible, by correlating contemporary visual measurements with contemporary historical measurements to make predictions about what will happen to painting and to history in the future?

Quite likely much of the analysis we develop in the formative years of a science of art will involve conclusions of little importance. But, as in the material and social sciences, we may expect that as we mature, our thinking and tools in the science of art will become as significant a field of study as the science of the psyche or our societies. Many people believe art is frivolous, self-indulgent, and at best entertainment. If indeed it is to be taken as a serious purveyor of ideas then it deserves to avail itself of the most sophisticated methods and tools available to the scholar.

Electronic Restoration

Preserving and Restoring Great Works of Art

Lillian Scwartz

Mid-way through the restoration of the Sistine Chapel artists and historians sent pleas to the Vatican to halt the cleaning. Those who were originally in favor of the project now observed that subtleties like shadows and other images that Michelangelo may have painted after the initial unveiling of the Ceiling, had been removed. Some critics allege the process resulted in objectionable changes in the colors. According to historian James Beck the cleaning of the Ceiling has caused it's appearance to be "irrevocably and radically changed".

The Sistine Chapel is but one of many examples in the destruction of great works of art. A few years ago, Beck was brought to court (and vindicated), after criticizing a restorer for removing the patina and smoothing out rough surfaces in a 584-year-old sculpture, thereby changing the fine sculptural modeling.

Other destructive restoration procedures have included replacing damaged areas of frescoes with plaster or even peeling the frescoes off the walls. Both methods have been abandoned as either taking away from the work or accelerating its deterioration. In addition, there are concerns about the effects of the solvents which react with the underlying materials, and also about the exposure of the frescoes to air pollution after cleaning where the dirt and grime acted as a barrier beforehand.

Until restoration practices are tested and agreed upon, what other methods could be used that are flexible and reversible? What analytic tool can provide information on the original paint surface? Is their a way to restore the work and yet not touch the work itself, or experience the art without traveling to the site of its actual installation?

In this age of the electronic medium there is no need to destroy our cultural heritage. Computers are already being used as management tools in conservation and even in some museums, but their value as aids in electronic restoration, art analysis and visualization is just now being acknowledged.

There are a number of special-purpose picture-processing programs and computers that can be used in multiple ways to catalogue, study, analyze, preserve, restore and view art. In addition, the technology can be used to construct three-dimensional models of buildings, museums, or historic sites with the art "installed" as in the real structure. Spectators can then experience a work of art in Virtual Reality as if they were standing in the room where it is painted. These same tools can also be used to aid in the solution of some of the oldest puzzles in art history.

Until recently restoration has been a totally subjective process. Electronic restoration allows for a more democratic approach with the sharing of data by teams of multi-disciplinary experts world-wide. Computer analysis and simulation can be used for a host of testing and verification tasks. Group decisions arrived at after assessing the techniques and methodology will be reached by consensus before the actual work is touched thereby eliminating many errors as well as facilitating the work of the restorer.

Works of art can be digitized and used for referencing to try to determine whether any deterioration to the real work is occurring or if the deterioration is simply due to the aging process. Still, the computer technology is not sufficient to avoid the destruction of works of art in cases where conservators plow ahead without general concurrence on every aspect of the historical evidence and the methods used. For example, a workstation programmed to map all the curves and cracks of the Sistine Chapel and locate weakened areas has been available to the restorers. But dispute over a confusing Italian Renaissance text has led to the current controversy over the completion date of the ceiling. The group that restored the Ceiling asserts an earlier date than Beck's followers; therefore, all the details, shadows, and other images that have been removed were not painted by Michelangelo.

Rather than rely on a subjective interpretation to distinguish individual colors difficult to isolate with the human eye, the electronic medium can isolate and identify the color, then recombine them. This method eliminates the individual assessment and intuitive reading of the areas to be restored or missing and leaves little room for ambiguity. When the restorer is in doubt, neutral tones and colors are substituted for what may have been the "true" colors. The restorer also differentiates his work from that of the artist so that the recreated sections appear very different from the original. If there is sufficient information on the "painting" the computer can be used to ascertain the original color values or present options that may have existed at the time of completion.

A tedious but rewarding color analysis and restoration was applied to Piero della Francesca's The Resurrection of Christ, St. Julien, and a face from the panel La morte di Adamo from the Leggenda della Vera Croce. Piero studied the relationships of color with the same intensity as he studied those of space and plane, uniting figures, architecture and landscape in a single complex web of repetitions and progressions. Unlike other fresco painters in the 1400's who tended to use each pigment in its pure state, Piero mixed one color with another, changing their intensities, and juxtaposition, to produce unexpected mutants. The purples or lavender grays, dusty reds, pungent greens, and soft ivories were readily identified by the computer. The pinks and blues showed up clearly in his Resurrection.

The Resurrection of Christ is housed in the Museo Civico in Piero's home town of Sansepolcro. Italy. Many years ago the fresco had been whitewashed. Much of the plaster has been removed but the question of whether enough white had been removed is disputed. Is there a means to deteine what the original work may have looked liked when it was completed over 500 years ago?

In the same museum, his St. Julien suffers from cracks, extensive damage to the background, and large areas that are simply missing. What would St. Julien look like if the cracks and missing areas were in place? An hour away in Arezzo in the San Francesco church are a magnificent series of ten very large frescoes by Piero. The panels are currently being restored by traditional methods but the cracks will always be visible. How would the very beautiful face of a woman from a section on the panel La morte di Adamo look if all the cracks were filled in?

The computer was used to examine the surface colors, and those found on

other works by Piero, to test whether Piero varied his palettes as well as to make adjustments and display variations of saturation, brightness, and hue that most likely changed due to restoration or aging. This color information was then used to fill in cracks in his works and restore missing sections.

After the color-correction of The Resurrection of Christ the sample that appeared to throw a reddish cast over the fresco also appeared to sharpen the features of Christ, the soldiers, and details of the landscape. The late art historian Eugenio Battisti, and advisor to the electronic restoration, inferred that Piero most likely took advantage of the afternoon sun, pouring through a window high-up on the west wall in the original architecture, to enhance his palette selection. He concluded that if more of the white plaster was removed the reddish glow would probably dominate the work. The analysis also yields a surprising new insight into The Resurrection of Christ revealing the thorn-based structure of a symbolic tree.

The most labor-intensive art analysis using the computer is the study of perspective applied to a fresco. Each element of the fresco and its architecture setting must be carefully fed into the computer. If the fresco was painted on a dome or exhibits unique planning, as in the case of Leonardo's Last Supper, then the task will require a relatively powerful computer.

The Last Supper, which is approximately fourteen by thirty feet in size, was painted by Leonardo in the refectory of Santa Maria delle Grazie and completed around 1498. Unlike the usual Last Supper, Leonardo's fresco becomes an active part of the room to any monk dining along one of the two side walls extending from the painting. Instead of a scene that remained separate from the observers (thereby evoking a spiritual distance) Leonardo's Christ and Disciples participated in the earthly meal.

Ever since it was painted the work was a cause for historical dispute. Does his Last Supper rely on rules of linear perspective and, if so, why is the vanishing point (considered to be at Christ's head, some fifteen feet above ground level) well above the vantage point of an observer?

Once the perspective construction was resolved the three-dimensional model was translated into Virtual Reality to permit the viewer to "move" about inside the room, inspecting the fresco from different heights, angles, and distances. The program transmits images of the fresco onto two small screens - one for each eye - that are encased in a helmet that provides a user with a stereoscopic pair of images that adds depth to the perception of the room.

Virtual Reality technologies can provide the general public an inexpensive way to view, enjoy, and understand the great artworks of the world. For the artist, art historian, and art restorer virtual prototypes can be set up anywhere on Earth to allow interactive study, shared analyses, and a permanent reference if the work is damaged.

Today, with Virtual Reality, the museum curator can "hang" an exhibition and "walk" through the galleries to review and make changes to the exhibit before it is open to the general public. While some museums are using computers as management servers, others have interactive programs where the spectator can browse through the collection to find what and where exhibits are located. A few museums will also include more information on the art and artists. The public can also access the museum in Virtual Reality and customize its journey through the exhibits to satisfy individual needs. Besides the exhibits other information in the form of text, animation and sound can augment the museum experience.

The Leaning Tower of Pisa may collapse at any time. A construction of a three-dimensional model of the Tower is underway to test the soils under and around the Tower, effects of the rays from the sun, structural materials and the effects of earthquakes in the area. The history of the inevitable collapse of the Tower will be reconstituted through the analysis of the materials affecting it's structure or permanency. And, by way of Virtual Reality, we will be able to "visit" the Tower well after its demise.

Beck has proposed a Bill of Rights for artworks that states: "All works of art have the inalienable right to live an honorable life and when necessary, to die a dignified death". The real work may die but the electronic data bases and simulations will live on through international networks and the distribution of CD-ROMS and other mass-storage disks. The immortality of two-dimensional paintings and three-dimensional sculpture and monuments will depend on the artists, students, historians, and others, including the public, who continue to use, and even add to, the computer systems for study, enrichment, or pure enjoyment.

Lillian Schwartz
ATT Bell Labs