

The Brave New World of the Computer

“[T]he human-machine interface stretches back to the sorcerer’s mirror, Alexandrian automata, the ‘input-box’ of the *Wunderschrank*, the lenses of a telescope or microscope, the scrolling mechanism of the panorama, and the individualized menus of the diorama. The desktop processor’s collection of overlapping windows and iconic taskbars is an extension of this ancient world of mediating and transporting apparatus that takes us directly to another reality by clicking on a relevant link.”

Barbara Maria Stafford¹

Computers surround us in every aspect of our lives. They wake us up in the morning, bring us the daily news, tell us what our schedules will be, facilitate our jobs and divert and amuse us at the end of the day. They are present in our homes, our work places, and our commercial and entertainment environments. Indeed, they are inside our most intimate relationships as we telephone, text message, email and “chat” with our friends and loved ones. They are so pervasive that, as Marshall McLuhan says of all new media, we can’t “see” them.

Technologies that are so important to us must be analyzed and understood. We must grapple with their histories and with their significance, with the values embedded in them. In this chapter, the history of the development of computers and the Internet is outlined. Then the myriad functions of computers are summarized. The rest of the chapter is given to an exploration

of some of the ways artists have used computers during the late twentieth and early twenty-first centuries.

Recently, several scholars have documented and theorized the history of the computer and its relationship to art production. The following discussion is particularly indebted to the writings of German art historian Oliver Grau, US computer exhibition curator Rachel Greene, Russian-born computer programmer and artist Lev Manovich and US scholar Barbara Maria Stafford.

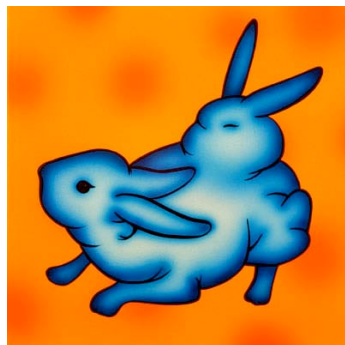
The Computer World Imagined

Humans cannot make what they cannot imagine; artists often create images and ideas long before they become actualities. The computer world in which we are immersed was anticipated in literature long before it was a scientific possibility. Barbara Maria Stafford has interpreted Rudyard Kipling's *Bisara of Pooree* as "an harbinger of our wonder-working technology, alternately rendering us ecstatic or miserable."² The *Bisara* was like a Personal Data Assistant (PDA) with magical powers. Kipling described it as "a tiny square box of silver, studded outside with eight small balas-rubies"³ that could make dreams come true—or wreck havoc on the owner. As Stafford notes, "Apparatuses, media, and technologies all share the *Bisara*'s property of standing between the self and the universe." Anyone who has found a long lost friend through Internet searching knows that computers, like the *Bisara*, can grant our wishes. And anyone who has had a laptop crash at a moment of crucial financial calculation knows that computers can also be, like the *Bisara*, nightmarishly out of our control.

Some literary visions of the computer world were compellingly dystopian, that is, they described a nightmarish world subject to technology gone awry. The title date of George Orwell's *1984* (first published in 1949) may be long passed, but the dark vision of a totalitarian,

mechanized bureaucracy run by Big Brother's manipulative “newspeak” is hauntingly familiar in an era dominated by news accounts of conflicts in distant and alien countries. Aldous Huxley's *Brave New World* (from which the title of this chapter is taken) described a chilling society in which computing machines are employed to manipulate genetics. Huxley's work presaged the controversial scientific experiments with cloning in the first decade of this century. William Gibson's *Neuromancer*, first published in 1984—five years before the development of the World Wide Web—foresaw the complex network of computer technologies that engulf us today.

Futuristic dystopias also appear in Postmodern art. Video artist **Max Almy** (b. 1948) presented a world completely dehumanized by technology in her *Leaving the 20th Century* (1982). Brazilian-born **Eduardo Kac** (b. 1962) implanted an identification microchip in his leg for his 1997 performance *Time Capsule*. He then registered himself with an online database for locating lost animals. Rupturing the human/animal separation at the same time it interrogated the relationship between surveillance and freedom, Kac's performance has been described as “an Orwellian dystopia come true.”⁴ Kac has also worked with genetic material as his artistic medium, collaborating with scientists to generate a fluorescent green rabbit that glowed in the dark (**13.1**). Kac's actual rabbit is precisely the kind of “Orwellian” monster that Los Angeles artist **Samantha Fields** (b. 1972) depicts in her day-glo paintings of mutant animals (**13.2**).



Fields uses computers to augment traditional painting techniques in creating her “cute” animals beset by visible tumors and parasitic twins.



Television programs and films have also anticipated our brave new computer world. As far back as the early 1970s, the television program “Star Trek” began to show us a world in which people spoke directly to computers through portals attached to their shirts (**13.3**). Such technology had not been developed at the time. Personal Data Transmitters were implanted in the colonists’ bodies in the 1986 movie *Aliens*, long before such devices were commercially available. Although computers are generally beneficent servants in “Star Trek,” they had a more ambivalent role in the film *Aliens*, where an android plotted against its human co-workers. Other mass media images reveal the imagined threat of computer technology, particularly of humanoid

robotics. Films like *2001*, *Westworld*, *Bladerunner*, *Terminator*, *The Matrix*, and *I, Robot* (13.4) are all apocalyptic imaginations of computer technology out of control.



Computer technologies, then, embody our fears as well as our dreams. How did they develop in relationship to art and mass media?

A Brief History of Computer Development

The history of the computer begins in the nineteenth century, paralleling the early histories of photography and film. As Manovich notes, “We should not be surprised that both trajectories—the development of modern media and the development of computers—begin around the same time. Both media machines and computing machines were absolutely necessary for the functioning of modern mass societies. The ability to disseminate the same texts, images, and sounds to millions of citizens—thus assuring the same ideological beliefs—was as essential as the ability to keep track of their birth records, employment records, medical records, and

police records. Photography, film, the offset printing press, radio, and television made the former possible while computers made possible the later.”⁵

In 1800, French industrialist **J. M. Jacquard** invented a loom to weave fabrics with complex designs. The loom was controlled by punched paper cards and has been called a “specialized graphics computer.”⁶ A few years later, **Charles Babbage** (1792-1871), a math professor at Cambridge, designed what he called the “difference engine” and the “analytical engine” that were essentially large calculators similarly controlled by punch cards. Babbage collaborated with **Augusta Ada King** (1815-52), Countess of Lovelace and daughter of Lord Byron, who wrote some of the first programs--she called them “instruction routines”--for the engines. King asserted that “The Analytical Engine weaves algebraic patterns just as the Jacquard loom weaves flowers and leaves.”⁷

While Babbage and King were working on their “engines,” **George Boole** (1815-64) was developing the binary system of algebra that translated mathematical statements into true/false statements. Boole’s equations--the basis of the zero/one processing used by computers--reveal how deeply embedded dualist thinking is in computer technology.

Although Jacquard, Babbage, King and Boole all initiated computer development in the nineteenth century, it was not until the middle of the twentieth that computers as we know them were first constructed. The first electrical valve computer, known as the Colossus, was built in 1943. The first digital computer, the ENIAC, was built at the University of Pennsylvania in 1946; it took up a whole room. And the first commercial computer, the UNIVAC, was available for purchase in 1951 (**13.5**). Thirty years later, IBM began to market the PC (personal computer) for home use. Early IBM PCs required users to type in all instructions. In 1984, Macintosh began to produce PCs with visual icons arranged on a screen designed to imitate a desktop. They

introduced their newly formatted computers in the *1984*-inspired commercials, first aired during the Superbowl, that were discussed in Chapter 11.



In 1945, **Vannevar Bush** (1890-1974) wrote a seminal article in which he asked what scientists should do after World War II ended and their talents were no longer needed to develop weapons of mass destruction.⁸ He concluded that they should work to increase access to the ever-expanding body of human knowledge. He imagined the home computer decades before it was created. He also imagined what

Theodor Nelson (b. 1937) was later to call hypertexts—texts linked in a non-linear fashion.

Bush realized that while most information in libraries was indexed alphabetically or numerically, the human mind operates by association. He looked forward to a computer—he called it a “memex”—with which “an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory.” Bush conceived of the memex as a desktop with slanting screen and keyboard, with large storage of material from books, magazines, etc., that allowed access to multiple textual sources at a time. In other words, he imagined the Internet and Windows operating systems decades before they were created.

The US RAND Corporation conceptualized the Internet in 1969. It was first actualized as the ARPNET linked four US universities as part of the military defense effort. The World Wide

Web was first announced by **Tim Berners-Lee** (b. 1955) in 1989. But even Berners-Lee did not foresee that the world would be almost immediately converted to the computer-linked network of words and images that shapes our lives today.

The “Reality” of the Computer

The images on our computer screens speak the same visual language as the images of the Renaissance. Like Leonardo da Vinci’s *Last Supper*, most images on the computer screen are characterized by idealized realism deployed to create an imagined world that, in most ways, mirrors and extends ours. Even as computer theorist Mark Tribe argues that “Synthetic computer-generated imagery is not an inferior representation of our reality, but a realistic representation of a different reality,”⁹ his emphasis on realism reveals that the goals of computer image-making involve the same realist agenda as the Renaissance. (Some theorists would take issue with his assertion of the “different reality” in computer images.)

Our concept of the body has been greatly affected by the pervasive presence of computer-generated images in our lives. Because they have been used to enhance, that is, idealize images of actors, models, and other celebrities, computers have changed the way we perceive the human form. Older men can magically have hair again (Kevin Costner’s balding was “reversed” for *Waterworld* [1995, US, Kevin Reynolds]; teens with acne can have smooth skin (Cameron Diaz’s scarred face became flawless in *There’s Something About Mary* [1998, US, Peter Farrelly & Bobby Farrelly, 13.6]) Many of the models whose beauty is celebrated in fashion magazines like *Vogue* have been visually idealized via programs like PhotoShop. Like the ads that appear in photo-based fashion magazines, the ads that pop-up on computer screens depict idealized bodies moving in what appears to be a spatial extension of the viewer’s. All of these computer

enhancements promote the ideal standard for human beauty, the standard against which we all measure ourselves.



The computer has extended the facility for idealization throughout our visual environment. Although the Internet is the primary avenue for computer-generated images to enter the home, it is not by any means the only one. The images in most Hollywood blockbuster films are partially and sometimes largely generated by the computer. Especially since the astonishing dinosaurs created by **Char Davies'** Softimage Corporation for *Jurassic Park* (1993, US, Steven Spielberg, **13.7**), the special effects made possible by CGI (computer generated imagery) have come to dominate sci-fi and adventure films like *Star Wars*, *Spiderman*, *X-Men*, *Gladiator* and *Master and Commander*. All of the female “super heroes” in the *X Men* movies were played by human actresses whose bodies echoed the extreme idealization in the comic books from which the films were taken. Such idealization is enhanced by CGI.



By the end of the twentieth century, advertising had colonized all new media; film, television, home videos, CDs, and DVDs alike could only be seen through a thickening haze of

commercial appeals. Many people initially hoped that the Internet would be a free, non-commercial enterprise that would allow everyone equal access to information exchange.

Unfortunately, such utopian hopes were not realized. Instead, the computer has also been flooded by advertising. This means that although they were developed out of diverse impulses—photography, film, and video were developed as artistic and commercial endeavors while the Internet came out of the military-industrial complex—all the mass media of the early twenty-first century end up serving the goals of capitalism: to market, distribute and sell goods and services.

Computer Functions

Computers are not just sale tools, however. They are “vehicles for transforming consciousness, extending memory, increasing knowledge, amplifying the intellect, and enhancing creativity.”¹⁰ If we can wade through the ads that “pop-up” every time we turn on our computers, we can begin to analyze and evaluate the ways that computers have entered our lives in the twenty-first century. Here are a few examples of the broad sweep of Internet activities in our daily lives.

- **INFORMATION:** Vannevar Bush’s memex was conceived as a machine for accessing data and computers have indeed become one of our primary sources of information about past, present, and future possibilities. In the mid-1980s, several major American newspapers began trial runs of computerized news services. Today, many people read the news online.
- **SCIENCE:** Vannevar Bush hoped the memex would facilitate intra-scientist communication. Indeed, the computer has done precisely that. Many of the remarkable scientific breakthroughs of the late twentieth and early twenty-first centuries were made possible by computer technologies.

- **RESEARCH:** Many libraries and publishing houses load their books and periodicals onto websites that can be accessed through the Internet.
- **CREATIVITY:** Computers are used to generate and alter many of the images that enter our lives, whether on the actual computer screens, or on the other screens of television, film, and printed publications.
- **MAPS:** We can locate and get directions to almost any site in the United States through services like MapQuest.
- **POLITICS:** Many political groups inform, activate, and solicit funds online. For example, Democratic Presidential candidate Howard Dean used the Internet to publicize and fundraise for his bid for the White House in 2003-04.
- **COMMUNITY:** We establish and maintain the ties of family and community through Internet connections. We also solicit help from our community by announcing our needs in web addresses. When a young man needed a liver donation to save his life, he created ToddNeedsALiver.com in the summer of 2004.
- **ROMANCE:** We date online and find people to date online, through organizations like Match.com.
- **COMMUNICATION:** We speak to our friends, relatives, colleagues, and those with whom we do business on computerized cell phones, via email, and in real-time chat situations.
- **VISUAL COMMUNICATION:** The computer now rivals the television in its role of bringing images into the home. We receive images of our world via the Internet and we distribute digitized photographs of ourselves and others over the Internet.

- **COMMERCE:** We can purchase almost everything online, from large items like homes and cars, to small, rare items like antique jewelry and archaeological artifacts.
- **HOME ENTERTAINMENT:** We watch movies, listen to music, and read novels that come to us via the Internet.
- **GAMING:** We play games alone and with our friends—and with people all over the planet whom we have never met in Internet-based games like Lineage.

Interactive computer games are one of the most important new art forms generated in the late twentieth century. Their impact is phenomenal: many teenagers—especially teenage boys—spend hours every day playing computer games. Several movies have been modeled after game forms. *Run Lola Run*, *eXistenz*, and *Spy Kids 3* (13.8) are but three examples. And, as we shall see below, artists have created art that echoes or parodies computer games.



Yet the history, form, content, and impact of computer games have yet to be adequately documented or theorized. As Mark Tribe, founder of Rhizome.org notes, “At a recent conference on the theory and culture of computer games, a panelist asked this provocative question: ‘If in the early years of cinema we already had seminal works that defined the language of the

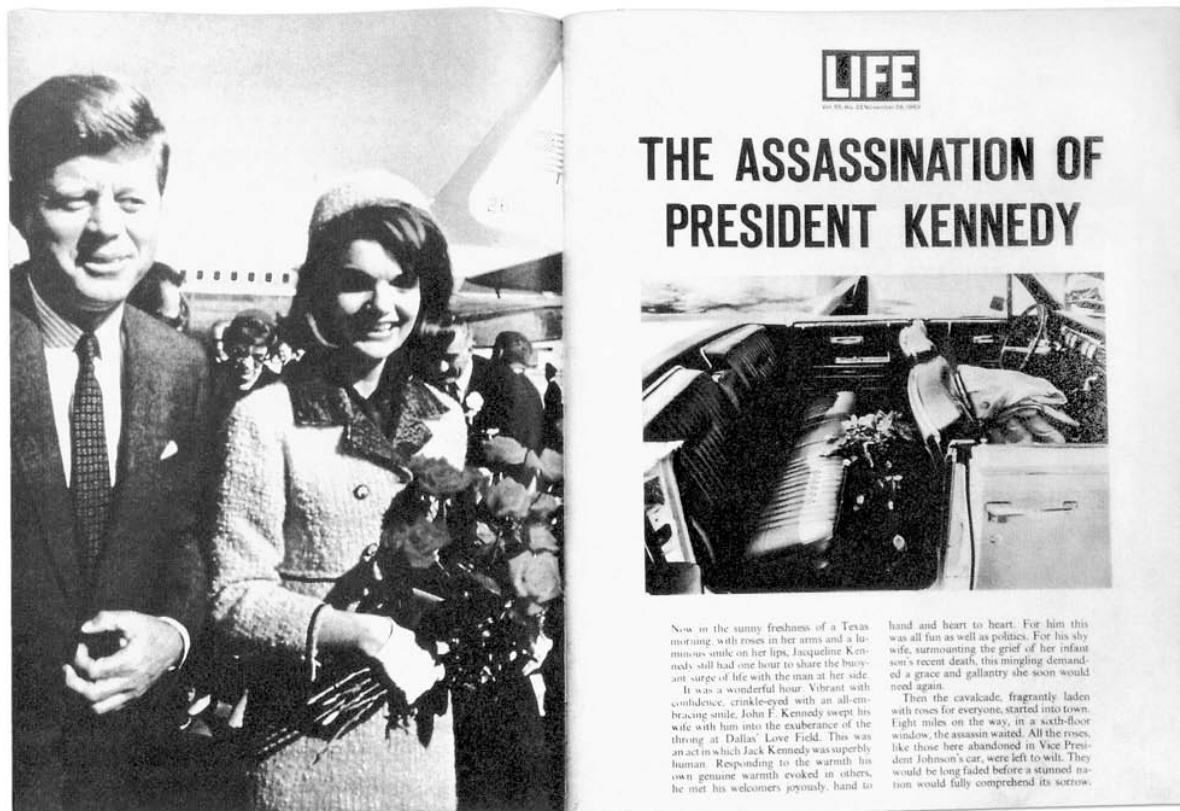
medium, why haven't we seen the computer-game equivalent of D. W. Griffith's *Birth of a Nation*?' The answer, of course, is that we have. The question is how to recognize it."¹¹

The Computer Screen as Visual Format



In order to understand the visual formatting of the computer screen, we can compare it to the pictorial compositions of the other flat, rectangular media we have studied. Gothic manuscript pages, for example, usually employed one of two compositions. A few pages were given totally to visual depictions, like the *Christ as Geometer* page (13.9) we studied in Chapter 2, but most relegated images to adornment of the initial letter of a paragraph or to columns of small images in the margins.

Early printed books echoed the arrangement of manuscripts, giving relatively small space to images in favor of large portions of text. A transition is seen in the early twentieth century, when the half-tone dot printing process allowed direct printing of photographic images in magazines and newspapers. The composition of pages in *Life* magazine is based on the images, with texts

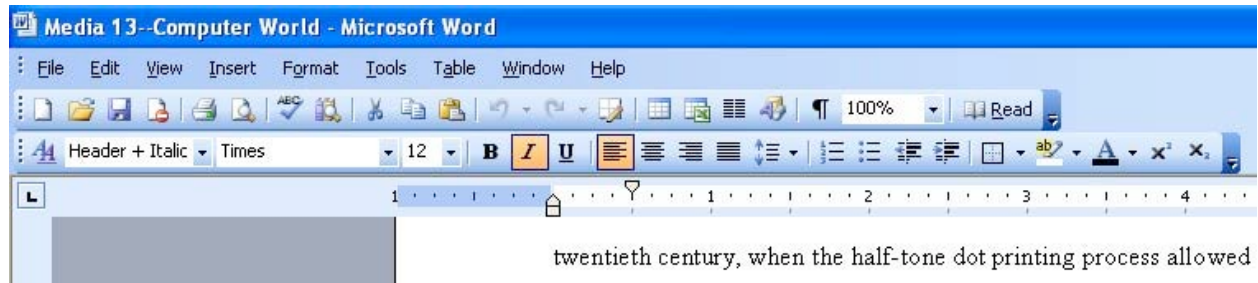


taking an auxiliary position (13.10). Early silent films like D. W. Griffith's *Birth of a Nation* alternated moving images with frames of printed text that contextualized the image and/or presented dialogue. Today, television news images combine central images (usually of the newscaster) with collaged boxes of images from other times and places and framing lines of text (13.11).



Remnants of all these visual histories can be seen on today's computer screen. When we open our computers to word-process, we see a colored screen with text and images framing it to

the top and right side (13.12). If we slide the mouse down to the bottom of the screen, several other icons pop-up for possible selection. If we open a file to begin writing, a white rectangle, covered with text appears. When we select a document to alter, a second white rectangle, also covered with text overlaps the former one. This basic configuration echoes that of the Gothic manuscript page with text central and a few small framing images.



If we go onto the Internet, the arrangement on the computer screen changes. Images may dominate the composition as they do in late twentieth century photo magazines. If we go online to game, the computer may very well alternate between moving images and text, much like the compositions of early silent films. And if we go online to shop or read the news, the screen may combine framed sometimes overlapping images with lines of text in compositions that echo those of television news formats.

Roots of Computer Art

According to Christiane Paul, “Artists have always been among the first to reflect on the culture and technology of their time, and decades before the digital revolution had been officially proclaimed, they were experimenting with the digital medium.”¹² Although computer art is a relatively recent phenomenon, we can begin to trace its history and to document some of its most important practitioners thus far.

The roots of computer art can be found in the early twentieth century avant-garde art. As Manovich notes, “One general effect of the digital revolution is that avant-garde aesthetic

strategies came to be embedded into the commands and interface metaphors of computer software. In short, the avant-garde became materialized in a computer...[For example] the avant-garde strategy of collage reemerged as the ‘cut-and-paste’ command, the most basic operation one can perform on digital data.”¹³ In addition to the Cubist technique of collage, computer art has been inspired by avant-garde art that focused on conceptual practices, engaged viewer interaction/completion of the artwork, and involved the use of random occurrence or chance. All three of these come together in Marcel Duchamp, whose work was not only important for the development of Postmodernism in general, but also for the development of Computer Art in the Postmodern period.

Duchamp’s decision to abandon what he called “retinal art’ in favor of an art of ideas was, as we have already noted, revolutionary. Among the ideas Duchamp introduced were the incorporation of chance, conceiving of the artwork as a set of instructions, and the use of collaboration with viewer-participants. It is hard to imagine the range and variety of today’s computer art without Duchamp’s expanded view of what art can be.

Along with several of the artists who participated in Dada, Duchamp incorporated chance into his work. Today, computer art often involves chance and random sampling in generating art images and events.

As a gift to his sister, Duchamp mailed her a set of instructions for the creation of an art object. The conceptualization of the artwork was thus located in the instructions themselves. Curator Rachel Greene draws a parallel between the instructions Dada artists generated for the production of Dada poetry and the net analogue of ‘code,’ the algorithms (the set of steps for problem solving) that form the basis of all software and computer operations.¹⁴ Computer art

similarly involves the use of instructions (that is, programs) to generate unpredictable artistic outcomes based on viewer participation.

Duchamp's assertion that the viewer completes the artwork was also revolutionary. It moved the locus of artistic genesis from the isolated maker to a collaborative event involving both maker and viewer. Duchamp's ideas anticipated the theories of Wolfgang Iser, who argued that the "art" of literature occurs when writers leave gaps in the text, gaps that are to be imaginatively filled by the reader in an ongoing co-creative process.

The 1960s performances known as Happenings not only involved collaboration with their audiences; they were also often conceived as collaborations between artists and scientists or other professionals outside the visual arts world. For example, Bell Labs engineer Billy Kluver worked with John Cage on the complex sound system for one of the earliest multimedia stage events, *Variations V*, in 1965. The collaboration between Kluver and the artists was so fruitful that the following year, he and Robert Rauschenberg—another early proponent of the interaction of art and technology—founded EAT (Experiments in Art and Technology), an organization that facilitated art's continued expansion into multidisciplinary space. Such collaborations continue in much of the computer art of the early twenty-first century.

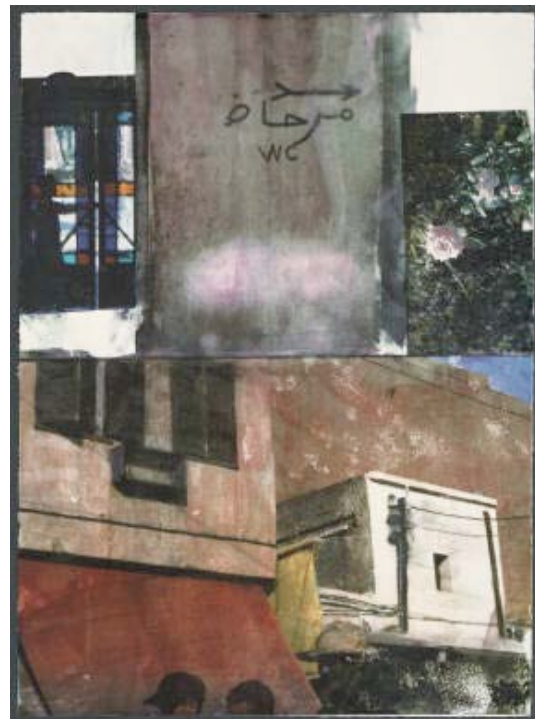
Concept, chance, collaboration, and interaction: these are the bases for computer art today, art that developed out of the avant-garde practices of late Modernism and early Postmodernism.

The Computer as a Tool for Artists

Computers are used in multiple and diverse ways by many different artists today. As Mark Tribe asserts, "Art has always been bound up with technology, and artists have always been among the first to adopt new technologies as they emerge. We monkey around with new

technologies in an effort to see what they can do, to make them do things the engineers never intended, to understand what they might mean, to reflect on their effects, to push them beyond their limits, to break them...It is precisely this newness that makes new media an interesting place for cultural producers to work..."¹⁵

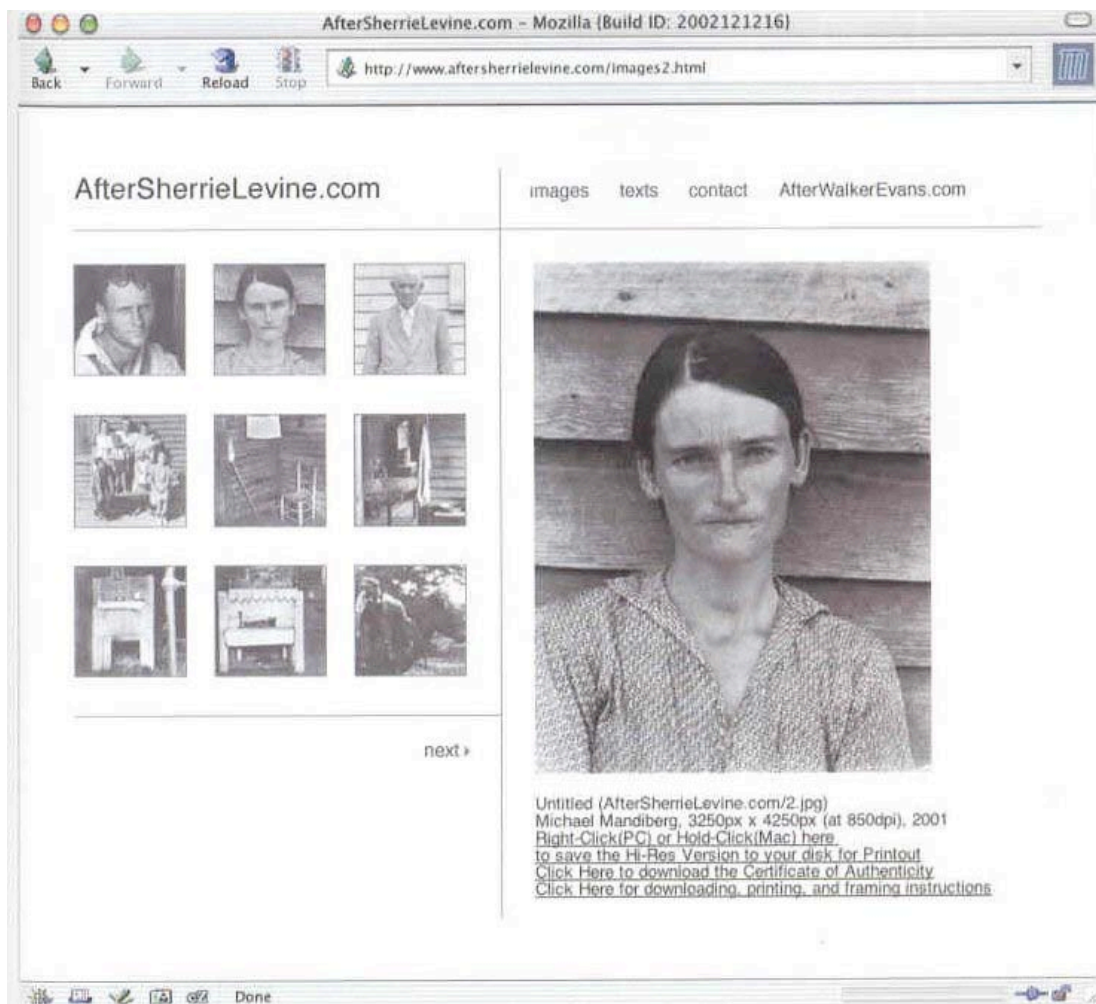
Computers can be used to enhance or manipulate traditional (analog) art forms. For example, Rauschenberg has used digital technologies to produce the kinds of collages he formerly did with silk screens (13.13). His *Appointment* (2000) involves a number of photographs that are scanned, printed, assembled into a collage, transferred to paper, then re-photographed and processed as a screen print.



Scott Griesbach (b. 1967) has used computer-generated collages to create wry comments on recent art history. His *Dark Horse of Abstraction* (1995, 13.14) places the heads of leading abstract painters on the bodies of racing jockeys. Jackson Pollock's head is on the jockey riding the lead horse; his horse's body has the texture of a Pollock drip painting. Griesbach's *Homage to Jenny Holzer and Barbara Kruger* (also 1995) places the two prominent image and text artists in the cab of a large truck that comes aggressively forward towards the viewer. For Griesbach, the art of Holzer and Kruger "hits you like a truck."¹⁶



Computers can also be used to locate and re-contextualize already existing images. Such appropriation continues the process initiated by early Post Modernists like Sherrie Levine (see Chapter 12). In 2001, Internet artist **Michael Mandiberg** created a series of images entitled *AfterSherrieLevine*, which has high-resolution images of Levine's work that can be downloaded and printed, along with (ironic) "Certificates of Authenticity" (13.15). As Greene notes, Mandiberg's title "*AfterSherrieLevine.com*" refers not only to Levine's famous title of her own, *After Walker Evans*, but also to an often hermetic and insider field of conceptual art now exposed to Internet culture."¹⁷ (Walker Evans was a US photographer who, like Dorothea Lange, worked for the FSA during the Depression.)



Other artists focus the particular qualities of the medium, working with computer- and Internet-specific capacities such as interactivity and audience expansion. **Douglas Davis** initiated *The World's First Collaborative Sentence* in 1994 when he began writing online and invited Internet participants to contribute to and expand his text. Davis's piece recalls the exquisite corpse game, where participants add words and phrases to poetic texts without being aware of what previous participants have written. But in Davis's work, viewers can scroll through pages upon pages of remarkably creative writing before they add to the sentence. One early passage reads: "...and why does **this sentence** have [to] sound so *disgusting and arty* who do we think we are **james joyce's greatgrandchildren** or some kind of gertrude 1. stein 2. stein 3. stein..." As Greene asserts, "Polyvocal, international and seemingly endless, the project is often held up as an emblem of internet aesthetics."¹⁸

All three of these strategies—enhancement of previous techniques, incorporation of pre-existing images, expansion of collaborative possibilities—can be seen in computer art created since the middle of the twentieth century.

Early Computer Art

Artists like **Bela Julesz** and **Michael Noll** began creating art with their computers and displaying it in commercial art galleries in the early 1960s. In the middle of the decade, other artists began to use satellite technologies as media for connecting artists, images and viewers. **Stan VanDerBeek** (1927-1984)'s *Movie-Drome* (1965) was a multi-media venue for audiovisual events that anticipated today's computer art interactions.

By 1970, museums were recognizing the importance of computers in art. New York's Jewish Museum staged the "Software" exhibition that year. Kynaston McShine, who curated the Museum of Modern Art's "Information" exhibition (also in 1970), wrote that the artists who

used computers to make art did so “with the sense of mobility and change that pervades their time,” adding that they were “interested in ways of rapidly exchanging ideas rather than embalming the idea in an ‘object.’”¹⁹

Throughout the end of the twentieth century, the possibilities of computer art and collaboration across disciplines or with varied audiences continued. Artists **Sherrie Rabinowitz** (b. 1950) and **Kit Galloway** (b. 1948) worked with NASA to create their *Satellite Arts Project* (1977), which allowed participants in distant locations to dance together. Their *Electronic Café* (1984, **13.16**) joined people throughout the city of Los Angeles in a “telecollaborative” performance.



Increasingly, artists have used the Internet to create interactive computer-based work.

Text artist **Jenny Holzer's** *Please Change Beliefs* (1995) is a three-part project sited on ada.web,

the online art platform named after nineteenth century programmer Augusta Ada King. Holzer's project invites participants to re-write and combine aphorisms like "Absolute Submission Can Be A Form of Freedom." As Tribe observes, "[S]ome technologies seem to hold considerably more promise for artists than others. The Internet is particularly ripe with the potential to enable new kinds of collaborative production, democratic distribution, and participatory experience."²⁰

Computers in Museums & Galleries

Today, computers are a widely acknowledged and accepted part of the art world. Publications on the subject abound. Most major US universities offer classes in computer art. Museums continue to exhibit computer-generated art. There are galleries specifically dedicated to computer-generated art, like C-Level Gallery and the Center for Digital Art in Los Angeles. And many museums, galleries and individual artists have virtual showrooms online. You can walk through a virtual tour of The State Hermitage Museum in St. Petersburg, Russia, at www.hermitagemuseum.org or see the Louvre Museum in Paris at www.louvre.fr/louvre.htm.

Increasingly, museums employ computer technologies to actively engage visitors with art works. The Jack S. Blanton Museum of Art at the University of Texas, Austin, used an award-winning iTour program to company their "Visualizing Identity" exhibition (August 2003-January 2004). Visitors learned about the artworks, heard the artists speak about their creations, read other people's responses to the works, and added their own responses. Journalist Sheree Scarborough noted, "Whereas studies have shown the average museum visitor spends less than one minute with a work of art, in this case visitors spent an average of 21 minutes. And iTour users were able to describe the works using more detail and accuracy, demonstrate a deeper level of understanding, and make connections to their own history and background. The iTour program encourages engagement and excitement about art..."²¹

In summer 2004, the Tate Modern Gallery in London mounted a major exhibition of the work of American artist Edward Hopper (see Chapter 7). In addition to dozens of paintings and drawings, the museum also displayed one of Hopper's journals. Because the journal itself would not stand up to repeated handling by the thousands of visitors to the exhibition, the museum opened the journal to one page and displayed it in a protective vitrine. They then generated a computer-driven facsimile of the journal. Viewers could stand at a computer monitor and touch the screen to get the simulated book to turn its pages, thereby making all of Hopper's notes and sketches available for viewing. Most visitors spent much more time examining the journal-simulacrum than they did viewing any of Hopper's paintings.

Many exhibitions of computer art have been sited completely online. **Cornelia Sollfrank** organized *Female Extension* (1997) as an Internet "Salon des Refuses" in response to the Hamburg Kunsthalle exhibition "Extensions." Critiquing what she called the "lack of competence and...insecurity of those who show, curate, categorize and judge net art," she created over 200 web sites ostensibly authored by female programmers and uploaded them into the Hamburg museum's server to call attention to the gender imbalance of artists included in "Extensions."²²

What follows is a small sampling of computer art, selected with no attempt to be exhaustive, but rather to give readers an introduction to the range of artistic approaches and practices in the early twenty-first century. Although computers are almost as pervasive in the arts as they are in our daily lives, this sample focuses on computer art based on collaboration, that is, on co-creation between multiple artists and/or between artists and non-artists in the genesis of the work, or between artist and participating audiences in the reception/activation of the work.

Computer Art About Art

Many artists have done computer works that address historic paintings. **Christian Moeller's** *Tintoretto, The Third Dimension of Ritratto de Gentiloumo* (1996, **13.17**) was commissioned by art historian and collector J. E. Weidinger as part of an exhibition on restoration techniques at the Vienna Kunsthistorisches Museum. Moeller created a simulacrum of Tintoretto's painting and used the computer to incorporate the "archaeology of the pictorial layers" that can be revealed when an image is studied by X-ray and infrared technology. As Moeller writes, "The surface of the picture was sensitive to touch and the visitors to the exhibition were able to 'erase' their way through the layers 'behind' the painting by hand."²³



British artist **Sam Taylor** (b. 1967) created a 3 minute, 44 second DVD film entitled *Still Life* in 2001. The film begins as an arrangement of luscious ripe fruit on a basketry tray, composed and lit in the manner of a seventeenth century Dutch painting. At first, the image appeared as fixed and permanent as a masterpiece painting, but as the film progressed, the fruit gradually decayed and rotted. Eventually, it disintegrated into viscous ooze, and flies swirled around it. The computer-accelerated transition from eternal to transitory reminds us that many of the Dutch still lifes were *memento mori*, evocations of the fleeting nature of earthly existence.

Polish artist **Tomas Ruller's** *Chimera* (*Prague/Halle/Los Angeles*, 1994/1997/2004) presents video images of people in city parks under an encaustic-covered screen. Inside the

ornate gold frame and under a wax coating textured to resemble brushstrokes, the digital images take on the appearance of Impressionist cityscapes. The figures in the urban scenes move through the daily transitions from sunrise to sunset, as the sophisticated technology imitates nineteenth century French painters' attempts at capturing the changing effects of light.

Bill Viola has always pursued new technologies, sometimes even designing and building his own equipment. Viola's *The Passions* (2000-2002, **13.18**) is a series of computer-manipulated video images commissioned by the J. Paul Getty Museum. One of the pieces, *Emergence*, is based on Masolino's *Pieta*, a 15th century painting that represents Christ in the sarcophagus, supported by the Virgin and St. John. Viola's *Emergence*, which was shot on film, transferred to video and greatly slowed, depicts two women lifting a man out of a well and laying him on the ground. The image moves so slowly and poignantly that viewers are compelled to diminish their usual speedy pace and contemplate its possible meanings. Viola's painterly, highly emotional works have led some writers to call him "the Rembrandt of the video age."²⁴



Computer Art About Photography & Film



Japanese artist **Yasumasa**

Morimura has used computer technologies in his photographically based works. In Morimura's "Daughter of Art History" series, he poses as the female figures in great paintings of the art historical past, thus effecting sometimes humorous, sometimes disturbing collaborations with great artistic masters. He writes, "My *Mona Lisa in its Origin* (1998. **13.19**) is no mere copy of Leonardo da Vinci's *Giocanda*. It represents

a computer collage of fragments of different Mona Lisas: a contemporary Asian man living in Tokyo—myself—playing Mona Lisa, the Louvre's *Mona Lisa*, a *Mona Lisa* of unknown provenance in the Prado, a Japanese copy painted in from of the Louvre, original, etc.

"In the approximately 500 years since Leonardo painted his *Gioconda* to the present, how many copies, homages, and forgeries have been made of it? One important aim, then, was to give visible form to this long built-up sedimentation of imagery—to wear this 500-year history layer on layer. The computer proved the most effective tool to help realize this effect."²⁵

Morimura is by no means the only artist who has used the computer to dialogue with the image of *Mona Lisa*. **Lillian Schwartz** used the computer to scan the left side of the *Mona Lisa* and the right side of a self-portrait of Leonardo da Vinci, then merge the two into a single portrait for her *Mona/Leo* (1987).²⁶ Insisting that viewers question the degree to which any portrait—and by extension, any artistic image—is as much about the artist-maker as it is about

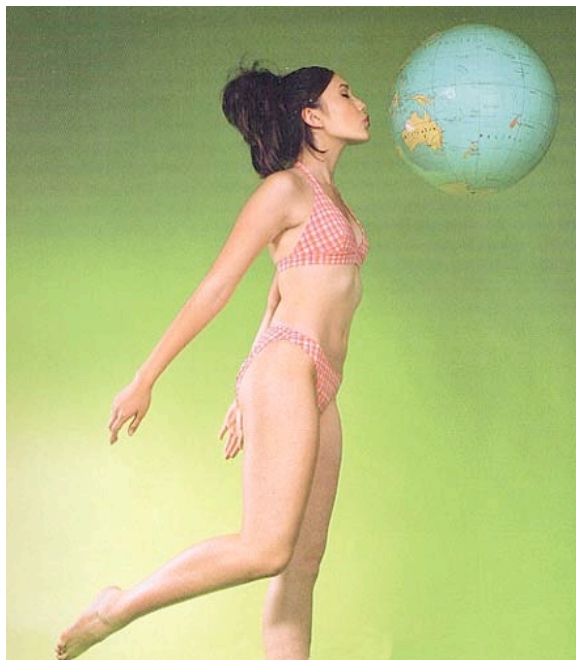
what is represented, Schwartz interrogates the relationship between art production and solipsism (the belief that all we know is known through the self).

Canadian artist **Rodney Graham** (b. 1949) explores both photography and film as cultural constructions (13.20). In 1989, he created a small camera obscura mobile and used it to take a series of photographs of trees. Calling viewers' attention to the fact that images "captured" by the camera obscura are reversed, Graham exhibited the photographs upside-down. Like Magritte's surrealist inversions of plants and stones, Graham's trees appear suspended from a grassy sky.



Graham's *Rheinmetall/Victoria 8* (2003) is an installation involving a large old movie theater projector screening a black and white close-up film of a German typewriter from the 1930s. As the film progresses, what appears to be snow falls onto the typewriter, piling and drifting over its surface and transforming the machine into a landscape. It is actually white flour being sifted above the typewriter: The snow is an illusion—as are all the images presented to us in film.

Perhaps Graham's most incisive works are the films he conceived, starred in, and directed that examine male identity as presented by mainstream cinema. As Cindy Sherman did in her *Untitled Film Stills* of the 1980s, Graham performs and thereby comments on the gendered possibilities of personhood presented to us by the mass media. Graham's *Vexation Island* (1997) looks at the romanticized pirate character. 1999 did *How I Became a Ramblin' Man* is an analysis of the stereotypical cowboy. And *Country Self/City Self* (2000) contrasts rural and urban male identities in nineteenth century France.



California-based artist **Bruce Yonemoto** (b. 1949) uses computers to manipulate film and video in works that address history, identity, and the visual traditions of cinema (**13.21**). Kansas City curator Dana Self has written perceptively about Yonemoto's work. "Working with screens, monitors, imagery, objects, footage, and ideas from video, film, television, and

popular culture, Yonemoto examines personal, cultural, and social memory and their roles in the construction of identity...[his] self-reflexive works suggest that memory is an apparatus of history's ongoing, open-ended production."²⁷

Bruce Yonemoto collaborated with his brother Norman on *Environmental* (1993), a video installation in which stock footage that was used in anti-Japanese war movies was projected onto 14 overlapping home movie screens. According to Self, "Yonemoto, who is a third-generation Japanese-American, exposes the high price paid by others for [American] innocence—including

his parents, who were interned in World War II relocation camps—and suggests that the unifying spirit of patriotism can also divide if not tempered by reason.”

More recently, Yonemoto has examined the seductive nature of film spectatorship in a work entitled *Hanabi Fireworks* (2000). Projected onto three large screens arranged to construct an architectural embrace, the piece begins with velvety blackness. Slowly, like the lightest of feathers, silvery gray forms began to drift down into view. It is not for some time that the viewer realizes the forms are actually film studio logos. RKO, MGM, etc. float past like flurries of snow. Then the darkness is illuminated by first one, then several, then a full symphony of firework explosions, with accelerating speed and in increasingly brilliant colors. The images are accompanied by what becomes a magnificent sound score composed by XX. The sound and the flashing lights climax in moments of intense beauty and then end in darkness and silence. The spectator has been transported, elevated, released, and finally abandoned onto the empty streets of real life. Nothing “real” has transpired. Only desire has been stimulated, visually satisfied, and drained once again.

Computer Art About Television



Philippine-born artist **Joseph Santarromana** (b. 1958) says he “grew up on television,” always aware of the power of the mass media (13.22). He works with media images and technologies to insert provocative images and ideas into the mass media environment. But he is adamant that his artistic use of media can’t be just an abstract practice.

Rather, it has to be a tool for introspective and problem solving; it has to be specific and related to his life.

Throughout the 1990s, Santarromana used computers to morph his portrait with mass media images. His “Icon Series” includes images of the artist’s face merged, by the computer, with Bart Simpson, Mickey Mouse, and Bob’s Big Boy, among others. In the “Desire Series” Santarromana’s is face merged with cultural idols: the star of the wildly popular television series “Buffy the Vampire Slayer,” rock musicians Kurt Cobain and Beck, and film beauty Jennifer Love Hewitt.

The morphing process allows Santarromana to visualize the physical and psychic merging that is part of the cult of celebrity. Fans often project themselves into stars’ bodies and lives. “If only I looked like...” and “If only my life were like...” fantasies allow fans to live surrogate lives through the images and actions of their favorite stars. Usually the merging is only an illusion, not a lived reality. A remarkable exception is MTV’s “I Want A Famous Face” program, which documents the process through which individuals undergo painful and sometimes risky reconstructive surgery to look like their favorite celebrities.

Santarromana acknowledges that his morphed images may appear humorous to most viewers, but he underscores the pathos inherent in them. The darkness of his skin makes the total elision of artist and celebrity icon impossible.

Merging with the Other is a theme explored in a different way in Santarromana’s *A Study in Empathy* (2002), an interactive installation that includes a chair, a lamp, and a television monitor placed on the floor below the seat of the chair. Projected on the monitor is an image of the artist’s feet. When viewers sit on the chair, they become the artist to the degree that they are in his position and thus seeing things from his perspective. In *Empathy*, Santarromana addresses the Buddhist concept of transformation through compassion. What happens when you experience empathy? Do you become the other person?

Computer Art About the Body

The mechanized aesthetic of the Futurists was translated into the mechanized body by Duchamp and other Dada artists. Today, the mechanized body is the stuff of popular culture in everything from the “Six Million Dollar Man” television series to the *Terminator* movies (13.23) and is subject to critical examination by artists using computers and the Internet.

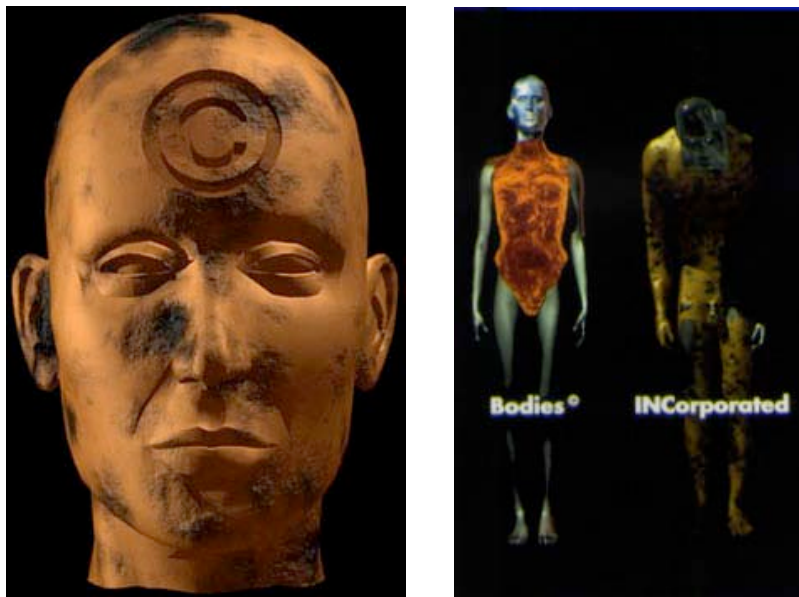


Donna Haraway was one of the first to theorize what the relationship between humans and machines meant to the body in the computer era. In the early 1990s, she argued that “The dichotomies between mind and body, animal and human, organism and machine, public and private, nature and culture, men and women, primitive and civilized are all in question ideologically. The home, workplace, market, public arena, the body itself

—all can be dispersed and interfaced in nearly infinite, polymorphous ways, with large consequences for women and others, consequences themselves that are very different for different people...”²⁸ Noting that “Communications technologies and biotechnologies are the crucial tools recrafting our bodies,” Haraway asserted that we are all becoming cyborgs—hybrid creatures composed of organisms and machines. Cyborgs are the monsters of the era; they cross

cultural boundaries and partake of more than one conceptual category. As such, cyborgs, like monsters, “have power-differentiated and highly contested modes of being...The cyborg is a kind of disassembled and reassembled, postmodern collective and personal self.”²⁹

Computer artist **Victoria Vesna** (b. 1959) worked with interface designer Robert Nideffer, sound artist Ken Fields and programmer Nathan Freitas, as well as Viewpoint Data Labs, a maker of 3D body models to create *Bodies©INCorporated* (1996-99) that addresses the construction of the cyborg body (**13.24**). Internet viewer-participants create their own bodies by selecting gender, sexuality (heterosexual, homosexual, bisexual, transvestite, or asexual), texture (clouds, water, glass, lave (red), lave (blue), clay rock, copper, blue plastic, red plastic, pink plastic) resolution, age group, and shapes of various body parts. After the body is assembled, participants are asked if they consider the body to be their alter (cyber) self, significant other, sexual partner...and if there are any special handling instructions.



A very popular site, *Bodies©INCorporated* is still active and still visited daily by people who want to create their own bodies online, their own avatars. Vesna writes that the title of the piece, “is a play on words. ‘Bodies’ is accompanied by a copyright symbol and ‘INCorporate’

draws on the Latin root, ‘corpus,’ while alluding to a corporation—bodies are incorporated into the Internet and their information is copyrighted. The logo of the project is a bronze head with a copyright sign on its third eye, signifying the inherent contradiction of efforts to control information flow with New Age idealism of interconnectedness.”³⁰ *Bodies©INCorporated* is an artwork that was conceptually based, requires viewer-participant interaction, and has chance inscribed in its very structure. Vesna notes that it was the *Bodies* piece that got her interested in projects that change and grow without supervision of the artist. She has subsequently developed several projects that have an open structure and no definitive end.

Computer Art & Identity

Images of the body are closely related to personal identity, another issue that several artists have addressed in various computer media: the concept of personal identity. Many artists challenge the Cartesian concept of the fixed self by inviting participants to craft altered and mutable selves. In 1999, for example, British artist **Heath Bunting** and Russian artist **Olia Lialina** developed the multilingual IDENTITISWAPDATABASE, in which participants share identities established via images and textual descriptions.

Mouchette was originally a character in a 1967 film by **Robert Bresson**. A still-anonymous artist (s/he only works under the name Mouchette) appropriated Mouchette’s teen angst persona to create *Mouchette Identity Shaping Interface* (mouchette.org, **13.25**) online in 1996. On the Internet, Mouchette is presented as Dutch (rather than her original French identity), perpetually thirteen years old, an artist, and extremely moody. Viewer participants can enter the site, see photographs of Mouchette, read what she writes, dialogue with her, and look at her ravishingly beautiful—and highly sexualized-- photographs of flowers. At one point, she tells viewers, “I think about killing myself, everyday, no joke. No, it’s not the best thought in the

world, but it races through my mind every day.” This text is positioned over a luscious photograph of a hot pink lily.



Viewer participants can supplement the suicide text, view more Mouchette images, or add their own images to the site. Mouchette’s “birthday party” on December 14, 2001 was a net.art group show. She told viewers, “It’s my last birthday party before I commit suicide. Every time the last one again.” As Greene observes, “Forever frozen as a sad-eyed thirteen-year-old, Mouchette’s kitschy persona veers into the sensational, as suicide and child pornography are outlined with unsettling sound clips, innuendo and disturbing images. In this project, the field in which an image is mechanically reproduced is a psychologically fraught, unsettling one.”³¹

Some artists create Internet art to addresses racial identity. **Keith Obadike**

(b. 1973) combines an ironic view of the history of slavery with the Internet's capacity to market almost everything in his *Blackness for Sale* (2001). Obadike's work ironically recalls the "Not For Sale" sign on the black man in Jean-Michel Basquiat's 1982 painting *Obnoxious Liberals* (discussed in Chapter 12). In the description section of the site, the artist wrote, "This heirloom has been in the possession of the seller for twenty-eight years. Mr. Obadike's Blackness has been used primary in the United States and its functionality outside of the US cannot be guaranteed. Buyer will receive a certificate of authenticity. Benefits and Warnings. Benefits: 1. This Blackness may be used for creating black art. 2. This Blackness may be used for writing critical essays or scholarship about other blacks. 3. This Blackness may be used for making jokes about black people and/or laughing at black humor comfortably. (Option #3 may overlap with option #2)...."³² Obadike's *Blackness for Sale* ran on eBay for just under a week.

Damali Ayo (b. 1972)'s *rent-a-negro.com* (2003) similarly related race relations to commodification. As the artist described it, "As our country strives to incorporate the faces of African Americans, you have to keep up. Rent-a-negro offers you the chance to capitalize on your connection with a black person. At any gathering our service can bring a freshness and tension that will keep things lively...We all go out for ethnic food every once in a while, why not bring some new flavor to your home or office...for all your friends and colleagues to enjoy!"³³

Lynn Hershman-Lesson (1941-2004) used digital technology from videodiscs to artificial intelligence computer programs to create several interactive works that addressed issues of feminist identity. She stated that such technologies "are the landscape of the present. Digital techniques further enhance the believability of manipulated images, even when they are bizarre and unquestionably inauthentic."³⁴ Hershman's *Room of One's Own: Slightly Behind the Scenes* (1990-93), was a virtual "peep show." Viewers were transformed into voyeurs as their gaze

activated eroticized images of women. Her *Agent Ruby* (2000) presented a character whose identity was shaped by her interaction with viewer participants. Christiane Paul asserts, “Ruby emphasizes the possibilities of agents as autonomous characters who take on a life of their own and essentially are social beings. The exploration of ‘intelligent’ technology in an art context addresses issues ranging from data-surveillance (dataveillance) and the invasion of the private sphere to the relationship between preformatted information and the imagination, as well as the artistic process in the age of information technologies.”

Computer Art & Science



In 1995, Joseph Santarromana collaborated with robotics specialist Ken Goldberg to create *Telegarden* (1995-present, **13.26**). A small garden, actually located in Linz, Austria, was planted around a robotic arm that could plants additional seeds, water

the earth, and generally take care of the garden. The arm is controlled by messages sent via the Internet. Participant viewers sent commands to the arms to add water, etc., in order to make the garden thrive. *Telegarden* is an early example of Internet-based art that was not only completely collaborative in genesis, but also interactive in content. A related chat room, called the “village square,” allows the participants to converse and build a sense of community around the garden. Conceptually, *Telegarden* uses computers to ease the perceived conflict between nature and technology.

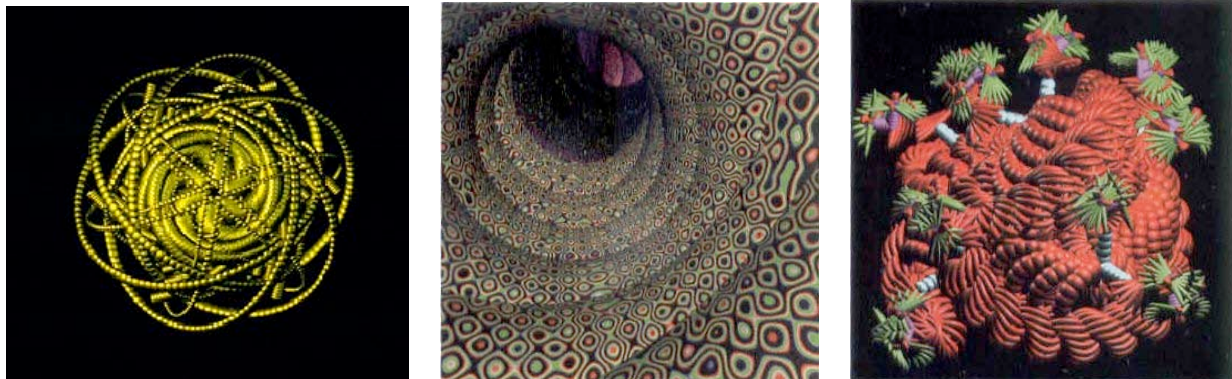
More recently, Victoria Vesna collaborated with nanoscientist Jim Gimsewski, media architect Ashol Sukumaran, and a large creative team, to create *NANO* (2003-04, **13.27**), an interactive computer installation that addresses the relationship between art and science. Inspired by the works of visionary architect and futurist R. Buckminster Fuller (1895-1983), the installation is composed of nine interactive spaces activated by embedded computer technology. The imagery of the spaces combines the hexagonal shapes used by Fuller in generating his famed geodesic domes with polyhedron buckyballs. Discovered in 1985 and named after Fuller, buckyballs represent the specific carbon molecule that is the basis of nanotechnology.



When viewers enter the *NANO* space, their images are captured by a camera and inserted into the video monitors that flank the entrance. They enter a dark, cave-like room with large screens on the walls. As they move through the room, the actions of their bodies appear to “push” the large images of molecules seen on the screens. In the center of another “cave” is a large bin of white sand. A film of the sand mandala (a ritual diagram of the universe) created earlier in 2004 by Buddhist monks is projected onto the “pool” of sand. To make the film, the camera was positioned at a distance from the mandala, showing the entire circular composition.

The camera then moved closer and closer to the center of the diagram until it actually entered a grain of sand and revealed the molecular make-up. At that point, the camera started its slow movement out and up, until the cycle started anew far above the mandala. Viewers are encouraged to pick up the sand and allow the crystalline white grains to sift through their fingers, as the brilliant colors of the video are projected onto the falling sand. “The natural world and digital display merge in this exploration of crystallography, creating a shared space where viewers experience physical properties beyond the traditional visual means.”³⁵

Several artists have used the computer to create synthetic environments for artificial creatures that behave according to the laws of nature (13.28). **William Latham’s** *The Evolution of Form* (1990) programs what the artist calls “computer sculpture” into genetic models, so that the complex shapes appear to mutate and evolve like living entities. **Karl Sims’** *Galapagos*



(1995) presents a system within which computer-generated “beings” seem to develop according to Charles Darwin’s theories of natural selection. Viewers participate by making aesthetic decisions about the colors and shapes of the “beings” and then watching while their creations either reproduce and survive—or are removed and replaced by the offspring of the survivors.

A-Volve (1994) by **Christa Sommerer** (b. 1964) and **Laurent Mignonneau** (b. 1967) is an interactive environment in which viewers create virtual creatures by outlining their shapes on a touch screen. The creatures become animated and appear to move through a pool of water.

Their forms determine their survival possibilities, so “aesthetics becomes the crucial factor in the survival of the fittest...*A-Volve* is a reminder of the complexity of any life-form (whether organic or inorganic) and of our role in shaping artificial life.”³⁶

Computer Art & Communication

Heath Bunting, who describes himself as “committed to building open/democratic communication systems and social contexts,”³⁷ was one of the first to explore the potential of art practices on the Internet. His *King’s Cross Phone In* (1994) staged a performance in telephone booths sited in a public place. He listed the telephone numbers of all the phone booths in the King’s Cross metro station in London (a busy commuter hub) and urged participants to call at 6 p.m. Echoing the instructions of Dada and Fluxus events, his “Cybercafe @ Kings X” page read: “During the day of Friday August 5th 1994 the telephone booth area behind the destination board at Kings X British Rail station will be borrowed and used for a temporary cybercafe...Please do any combination of the following: (1) call no./nos. and let the phone ring for a short while and then hang up, (2) call these nos. in some kind of pattern (the nos. are listed as a floor plan of the booth), (3) call and have a chat with an expectant or unexpectant person, (4) go to Kings X station watch public reaction/answer the phone and chat, (5) do something different.”³⁸

The following year, Japanese telecom giant NTT commissioned Bunting to do what became *Communication Creates Conflict* (1995). Bunting dealt with the commodification of communication and the tensions of cross-cultural, trans-national communication in a textual poem accompanied by photographic images of the telecommunications industry. He invited viewer participants to submit texts that were transformed into placards that he distributed at Tokyo metro stations, with the text and distribution process archived on the results page of the site. In phrases echoing the text art of American Jenny Holzer, some of the submitted texts read:

“Perpetuate your own myth,” “Emotional not rational computing,” and “Cultivate your own weirdness.” Greene notes that “*Communication Creates Conflicts* shifted the focus to interactions: web users’ active and expressive roles in Bunting’s encounters were important parts of the work.”³⁹

Warren Stack diagrams modes of communication by mapping social networks, themes and what he calls “semantic networks” (i.e., the relationships between people and topics) in the interactive site *Conversation Map* (2001-present). As Paul notes, “In all likelihood, these types of dynamic maps of communication will increasingly become part of websites and networked environments that rely on online conversations.”⁴⁰

Networked environments that function with maps are basic to the structure of many computer games today.

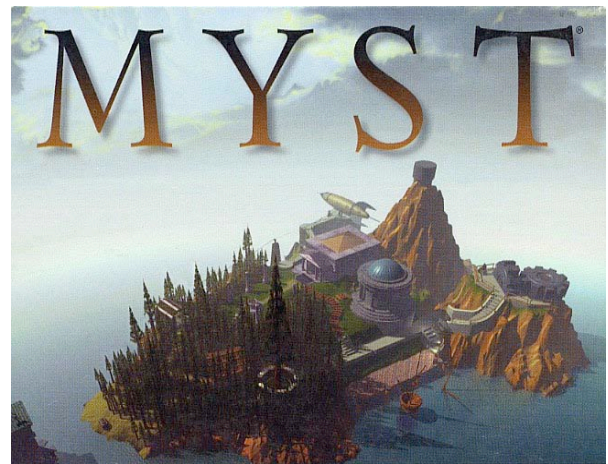
Computer Games

Developed in the mid-twentieth century by the military, Spacewar was one of the first computer games. It was played on a large mainframe computer.

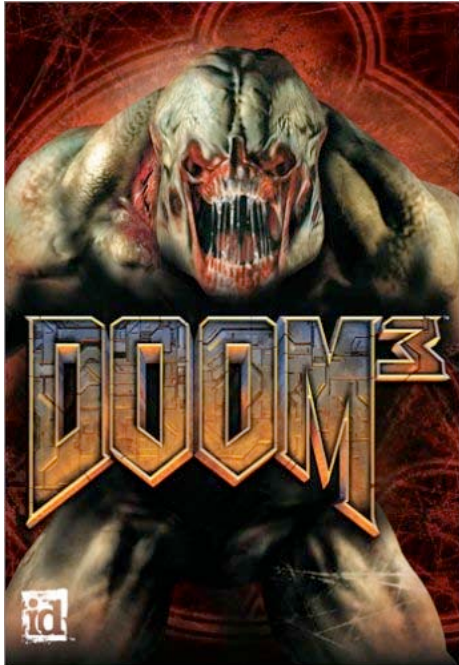
The man who is largely responsible for bringing computer gaming into the American home is **Nolan Bushnell** (b. 1943). As a young man, Bushnell worked in advertising and for an amusement park. He studied engineering in college (where he played the Spacewar game) and hoped to work for Walt Disney when he graduated. But he never got a job offer from Disney, so Bushnell combined his interests in promotion and entertainment with his technical training and founded Atari in 1972. Atari engineers developed the computer game Pong. Soon thereafter, a home version of Pong followed. Bushnell stayed with Atari through most of the 1970s, during which time the company revolutionized home video-gaming. In the late 1970s, Bushnell founded Chuck E. Cheese Theaters, the chain of restaurants in which children eat pizzas and play games

in video arcades. In the 1980s, Bushnell conceived and marketed Andy, a personal robot with a programmable personality. By the turn of the century, he was working on a PC-gaming/Internet system under the aegis of his new company, uWink.

Personal computer games have changed radically since Bushnell's Pong, which was a simple moving graphic of ping-pong. Certainly, the medium continues to reproduce sports--both team sports, like basketball, and those based on individual competition, like car racing. There are also lots of games that, echoing the original Spacewar game, are based on warfare, such as the War Craft series. There are games based on solving puzzles, like MYST (13.29). There are games based on role playing, many ultimately modeled after board games like Dungeons & Dragons. And there are conceptual challenges, like SimCity, for which players must erect imaginary urban centers.



Some of the most popular games are first person-shooter games, in which players assume powerful avatars, acquire weapons, and win by killing or wounding various foes. In 2004, idSoftware and Activision released the long-awaited Doom3 first person-shooter game (13.30).



Several years and over \$10,000,000 in development, Doom3 offered many hours of challenging play to even the most skilled gamer. The game narrative dealt with a US Marine fighting corporate greed and the abuse of science, which encouraged players to feel somehow morally justified in their quest to eradicate the bad guys.

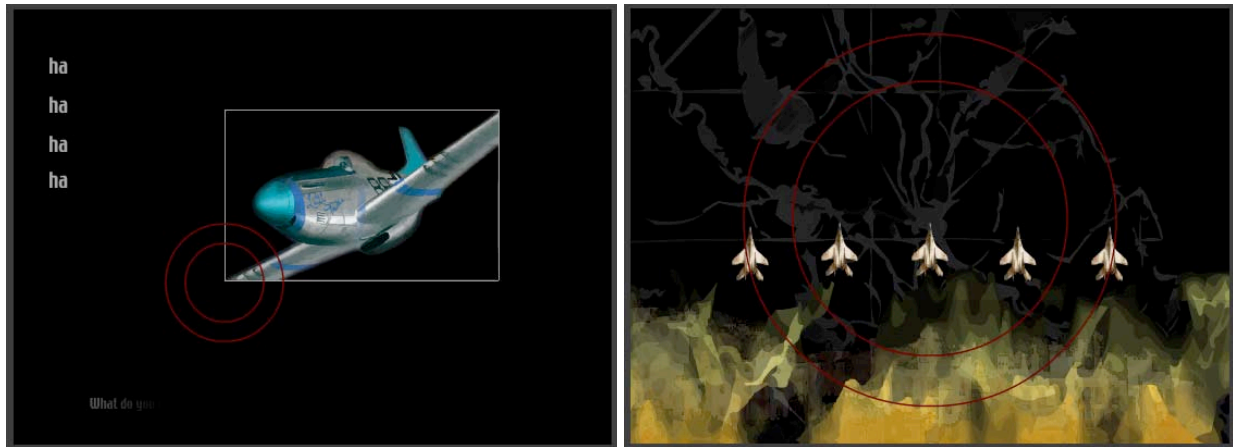
Doom3 was lauded for its challenging format, but even more for its visuals. The computer-generated virtual environment was dark and murky, with deep shadows and

futuristic architecture recalling early films like Fritz Lang's *Metropolis* or Ridley Scott's *Blade Runner*. Video gaming is a multi-million dollar business, its profits far eclipsing other entertainment fields like music and film. Because so many people spend so many hours playing the games, the medium is profoundly influential. Some players identify with game characters and wear tee-shirts emblazoned with their avatars' names. Other players imitate characters' personae in their daily lives. And several blockbuster films have been based on specific computer games, including *Street Fighter* (1994, **13.31**), *Mortal Kombat* (1995) and *Resident Evil* (2002).



Like any new art form, computer games are controversial. Some critics bemoan the fact that many games focus on male competition and aggression. Others find the violent content of some games troubling. *Grand Theft Auto*, for example, was widely protested because it was constructed so that players were rewarded for assaulting women.

Several artists have employed computer game structures for creative production. **Ken Marchionno** (b. 1961) makes computer art that deconstructs the form and content of standard gaming (**13.32**). Marchionno was trained in traditional photography; he had to learn about digital photography and interactive computer software to satisfy the demands of one of his teaching jobs. Exposure to the new technologies immediately affected his artwork. As he says, “When a technology starts to speak to you, it gives you another way to think about and produce work.”



Something (2001), one of Marchionno’s early interactive pieces for the computer, juxtaposes images of US politicians with a map of Iraq and audio of jokes and laughter in a “game” that interrogates global politics. Marchionno built the “game” with a randomizing code so that its overlapping elements would interact with each other. He employed a similar structure for *Flesh*, an interactive computer compilation of male and female images with footage from a

Russ Meyer film. Marchionno's *Flesh* uses game technology and structure to explore the intersection of voyeurism, sexual objectification and electronic representations of nature.

While many computer games simulate fantasy worlds, at the time of this writing, none of those marketed for personal purchase yet offers an immersive virtual world for game play. As of 2004, virtual reality is still primarily the domain of scientists (usually military scientists) and the few artists who have entered the scientific realm.

Computer Art & Virtual Reality

Media theorist Oliver Grau has traced the history of virtual reality back to Greek temples like the Villa of Mysteries at Pompeii, which surrounded participants with paintings. He notes that the Pompeii paintings comprised “a palpable testimony to a virtual reality, which not only sought to involve the observer through its subject but also, through the use of panoramic images, specific colors, and dramatic gestures, aimed at emotionally arousing the observer to ecstatic participation: the psychological fusion of observer and image in the cult.”⁴¹ Early Renaissance chapels like Giotto's Arena Chapel at Padua (13.33) performed similar functions by surrounding



worshippers with sacred images intended to merge vision and ritual participation. Later in the Renaissance, Franciscan friar Bernardino Caimi conceived of building eleven structures to establish a sacred circuit echoing the Stations of the Cross. The complex of buildings erected on Sacro Monte of Varallo, Italy, depicted the life of Christ from the Annunciation to the Crucifixion. Visited by thousands daily, the buildings combined paintings with three dimensional sculpture. The Sacro Monte Stations of the Cross structures have been called “the first optical mass medium.”⁴²

The nineteenth century version of Sacro Monte was, of course, the panorama, like the French one portraying the Battle of Sebastopol discussed in Chapter 7. Some of the world fairs erected during the nineteenth century similarly offered virtual reality-like immersions in simulated environments. The fairs were immense in scale and immensely popular. For the Chicago’s World Fair of 1893, architect Daniel Hudson Burnham oversaw the construction of an entire—and entirely simulated—city (13.34). Historian Erik Larson notes Brunham’s



extravaganza included “Whole villages from Egypt, Algeria, Dahomey and other far-flung locales [as well as] a single exhibition hall [with] enough interior volume to have housed the U.S. Capitol, the Great Pyramid, Winchester Cathedral, Madison Square Garden, and St. Paul’s Cathedral, all at the

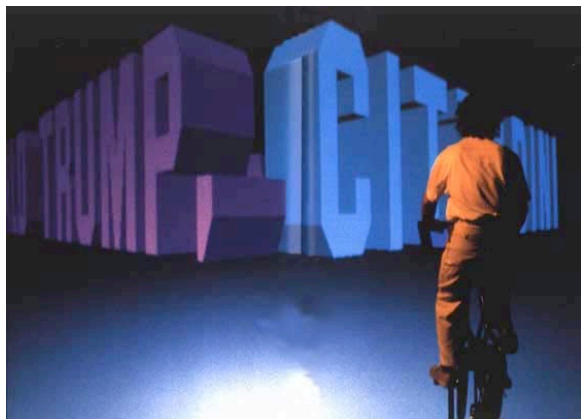
same time.”⁴³ People walked down the Street in Cairo, surrounded by twenty-five buildings inhabited by almost two hundred Egyptians; they visited Buffalo Bill’s Wild West; and they picnicked on the Wooded Island. In a nation of about 65 million people, the fair received over

27.5 million visits, often more than 700,000 a day. The Chicago World's Fair was Las Vegas before Las Vegas. It was a virtual reality world.

The Chicago World's Fair was also, coincidentally, the first time the two main ingredients of film were brought together: both Muybridge and Edison mounted displays at the fair. Films, especially in-the-round IMAX films (13.35), are additional sources for virtual reality constructions.



Virtual reality today does not require the special structures of Renaissance chapels or nineteenth century panoramas or modern IMAX films. Nor does it require the immense building efforts of the architects of the fairs. It is generated on computers.



An early virtual reality work that explores space and the mapping of space is **Jeffrey Shaw's** (b. 1944) *The Legible City* (1989-91, 13.36), an interactive work in which the viewer rides a stationary bicycle placed between three large screens. As the

viewer pedals the bicycle, the computer generates and projects lines of large, apparently three-dimensional words naming key urban elements—streets, buildings, signs, etc.—and the viewer seems to travel through them. Shaw generated different programs to present simulated cities that correspond to different cities: Manhattan, Amsterdam, Karlsruhe, etc.

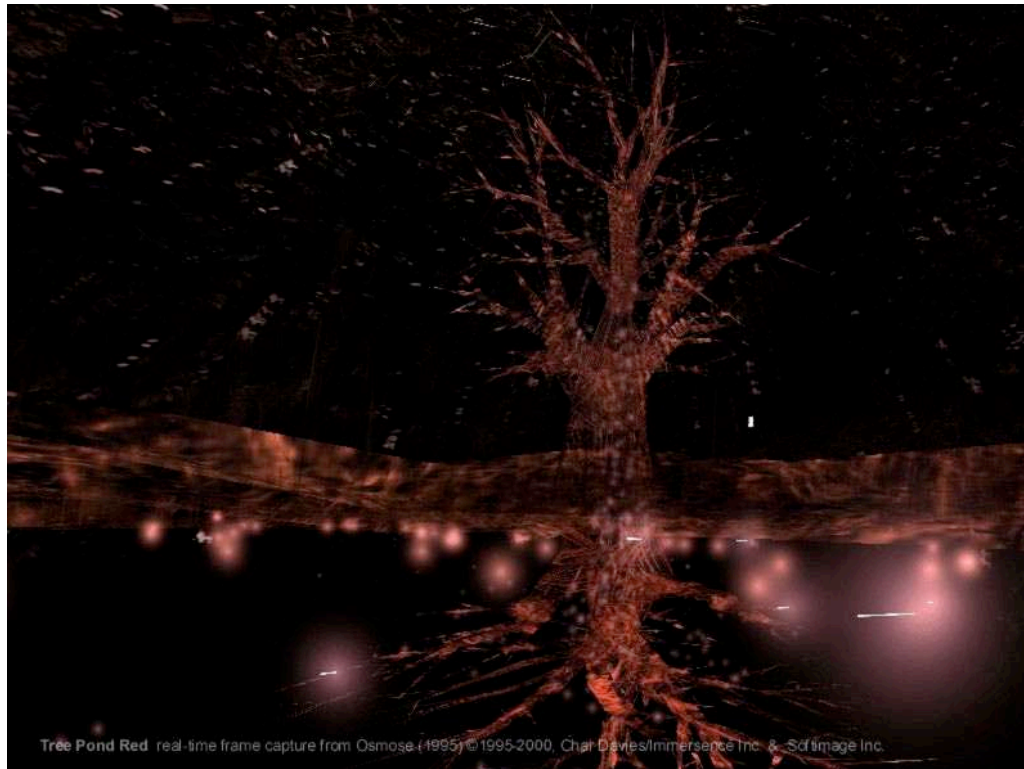
Whereas Shaw uses virtual reality to simulate existing spaces, Char Davies uses it to create new visual realms.

Virtual Reality & Char Davies' Immersive Paintings

Although Canadian artist **Char Davies** (b. 1954) began her career as a painter and filmmaker, she has been working with computers since 1987. She helped found Montreal-based Softimage, a leader in the development of computer graphics software. After Softimage's programs helped create the dinosaurs in *Jurassic Park*, the company was purchased by Microsoft. Davies continued her work with the Softimage and gave them co-credit on her first major virtual reality project, *Osmose* (1995, **13.37**). Davies describes *Osmose* as "an immersive virtual environment utilizing head-mounted display and motion tracking of breath and balance. As in the scuba diver's practice of buoyancy control, one breathes in to float upwards, breathes out to fall and leans gently to change direction." Unlike many interactive computer projects, *Osmose* is based on solitude, not shared experience. To explain how this solitary experience works as a space for exploring the interaction of self and world, Davies quotes French philosopher Gaston Bachelard: "It is only when human solitude deepens that the intimate space of self and world space blend." Like a scuba diver about to enter the sea, the *Osmose* participant dons a body sensor vest and head mounted display. The participant can be seen, in silhouette, through a door-like opening in the public viewing area. The images and sounds that the immersed participant experiences in the 15-minute journey through the *Osmose* world are projected onto a window-like screen on the other side of the public area.

When immersed participants first enter the *Osmose* space, they see a three-dimensional grid based on the Cartesian coordinates that are fundamental to computer programming.

Controlling their movement by breath and balance, they move slowing into the central space of



the virtual world, a clearing around a large tree. There are seven nature-inspired spaces around the clearing: the abyss, cloud, forest, leaf, life worlds, pond, and subterranean spaces, as well as a space of text created by quotations from Bachelard, German philosopher Heidegger, poet Rainer Marie Rilke, among others, and a space of green columns of computer code. One of the quotes comes from Bachelard's *The Poetics of Space*: "...by changing space, by leaving the space of one's usual sensibilities, one enters into communication with a space that is psychically innovating...For we do not change place, we change our Nature."⁴⁴

As she did in her paintings, Davies created *Osmose* to evoke rather than illustrate. Unlike the plastic artificiality of much computer-generated art, the images in *Osmose* appear fragile and translucent. The spaces are based on an aesthetics of ambiguity. Luminous streams flow through the spaces, like schools of silvery fish or flocks of tiny birds...or perhaps the bubbles of air floating to the surface from the breath of a scuba diver. Although some participants find *Osmose* frightening, most speak of it as relaxed and contemplative, describing the altered state of awareness as something like peaceful meditation.

In 1998, Davies completed *Ephemere*, a second project that immersed participants in a virtual reality world. The images in *Ephemere*, although loosely based on the three levels of landscape, earth, and interior body, are much more abstract than the recognizably nature-based images of *Osmose*. Lush and colorful, the *Ephemere* environment is like moving through a sensuous three-dimensional painting.

German critic Oliver Grau argues that Davies' *Osmose* is "a signpost in the history of the media, like the films of the Lumiere brothers or the early panoramas, not least because of its aesthetic utilization of new technologies of immersion and illusion."⁴⁵ He adds that, for Davies,

Ephemere is “inspired by an actual place in her native Quebec and, in a certain way, symbolizes a lament, an elegy, a remembrance space for the passing of nature as we have known it.”⁴⁶

Virtual Reality & Memory Theater

The links between information and space have been addressed since ancient times. As Paul notes, “In the second century BCE, the Roman orator Cicero imagined inscribing the themes of a speech on a suite of rooms in a villa, and then delivering that speech by mentally walking from space to space. At the basis of this technique is the realization that our memory works in a spatial way.”⁴⁷ Perhaps the prehistoric caves like Grotte Chauvet functioned in the same way for the shamans who used them ritually. Certainly, Catholic Stations of the Cross in general and Caimi’s Sacro Monte in particular, as sculpted sites arranged in a circuit that participants walked while contemplating specified moments Jesus’ life, similarly linked space and (religious) information.

As early as the Renaissance, artists began to imagine what they called “memory theaters”—temple-like structures conceived as storage spaces for the accumulated knowledge of their time. **Guilio Camillo** (1480-1544) constructed a wooden memory theater that was displayed in both Venice and Paris. Memory theaters not only stored and displayed knowledge; they also allowed the kinds of associative links between data that Vannevar Bush conceived of with his “memex.” A modern mass media imagining of a memory theater is seen in the movie *Dreamcatcher* (2003, US) where a man avoids the mind control of aliens by fleeing to hidden corners of the “space” of his mind.

Throughout the Postmodern era, artists have been looking at knowledge and memory by linking the associative properties of the mind with the technical processes of the media. In *Theater of Memory* (1985), **Bill Viola** related the electrical processes of the human brain with

those of video technology (13.38). **Emil Hrvatin's** *Drive-in Camillo* (2000) linked Camillo's memory theater with the theaters of early modern times.



Hungarian-born **Agnes Hegedues's** (b. 1964)

Memory Theater VR (1997) is a virtual reality installation composed of a panoramic screen encircling an open space.

Viewer participants enter the space and manipulate the screen images with a mouse located on a central plexiglass

pedestal. Images and information are displayed on four simulated architectural levels across the screen, leading viewer participants to see links and make associations not possible in linear narrative presentations. As Grau describes, "Hegedues's panorama formulates a rich array of associations, leading the visitor through the history of art and media, including mannerist, futurist, and deconstructivist virtualities. It represents a distillation of decisive historical intellectual turning points, or media emblemata, which are configured before the inner eye in changing combinations, allowing the visitor to form individual memories of the images."⁴⁸



Hegedues worked with Jeffrey Shaw and German-born **Bernd Lintermann** (b. 1967) to created *ConFIGURING the CAVE* (1996, 13.39), a virtual reality environment that employs the CAVE (Cave Automatic Virtual Environment, or Compute Automated Virtual Environment)

program to create stereoscopic images by means of four rear-projected screens. Viewers interact with the projected images through a large wooden puppet that acts as their avatar.⁴⁹

The name CAVE recalls both prehistoric cave paintings and Plato's cave allegory (both discussed in Chapter 2). One of today's most technologically advanced formats for image creation thus refers back through time to the very roots of Western culture's art and mass media.

Concluding Remarks

In this book, we have discussed the ongoing dialogue between the content of art, the format it is presented in, and the technologies that have been developed for such presentations. We have ended with a discussion of computer technologies and computer art. We have found that over time—no matter what the medium—artists have dealt with related images and issues. As Christiane Paul correctly observes, “From a very general perspective, art, be it digital or analogue, has always addressed a set of core issues: the aesthetics of representation and perception; the human condition as it changes due to cultural and political developments; the emotional and spiritual realm; and the individual's relation to society and community—to name just a few. Art will always reflect of the specifics of cultural change, and ‘technologies’ in the broadest sense have always been an important part of this transformation of culture.”⁵⁰

We have focused on cultural icons—those images that powerfully express the fundamental beliefs and values of the cultures that produce them—and particularly on iconic images of the human body. Computer-generated images of the body are part of a complex history that stretches back to Ancient Sumer, through Classical Greece, the Gothic Middle Ages, the Renaissance and into the Modern and Postmodern eras. As we continue to evaluate today's iconic images, we have to consider how the idealized advertising and entertainment images, made perfect beyond today's human capacity, reflect our current cultural values, how they tell us

who and how we “should” be. In considering how technology is making such perfection increasingly possible, we need to take into account both the utopian hopes for empowerment and the nightmarish fears of annihilation that are currently associated with the human-machine combination known as the cyborg.

In our survey of the relationships between art and mass media, we have seen several representational formats that derive from the framed rectangle: the window and mirror of the Renaissance and Baroque, the screen and grid of Modernism, the map of Postmodernism, and the network of the Internet. Lev Manovich suggests that the loop might be the fundamental representational format for the computer age: “Can the loop be a new narrative form appropriate for the computer age? A computer program progresses from start to end by executing a series of loops.”⁵¹ If that is the case, then Western culture is turning from the linear model of historical progress to a model that however inadvertently echoes the Aztec concept of circular or cyclical history.

Another representational model—as seen in the multiple windows on computer screen—embodies the fragmentation and diversity we have seen is fundamental to Postmodern cultural practices. Such multiplication of images appears in mass media products like the television series “24” that frequently employed multiple views or the film *Time Code* (US, 2000, Mike Figgis) with its four simultaneous screens. No matter which representational format emerges as iconic for the developing technologies of the computer age, it is certain that it will be a period characterized by the ongoing dialogue from art to mass media back to art again. It is also certain that we, as viewer-consumers of the images generated by and for our computer world, will have to maintain our visual literacy and continue our critical analysis of the pictures of ourselves and the world that we are presented with.

As Barbara Maria Stafford has asserted: “Technology, like art, needs insight.”⁵²

¹ Stafford and Terpak 110.

² Stafford and Terpak 109.

³ Rudyard Kipling, “The Bisara of Pooree,” in *Plain Tales from the Hills* (New York: Charles Scribner’s Sons, 1907) 280-281. Cited in Stafford and Terpak 109.

⁴ Christiane Paul, *Digital Art* (London: Thames & Hudson, 2003) 173.

⁵ Lev Manovich, *The Language of New Media* (Cambridge: MIT Press, 2001) 22-23.

⁶ Manovich 22.

⁷ Quoted in Manovich 22.

⁸ Vannevar Bush, “As We May Think,” *Atlantic Monthly*, July 1945.

⁹ Manovich, xxiii.

¹⁰ Randall Packer & Ken Jordan, eds. *Multimedia from Wagner to Virtual Reality* (New York: W. W. Norton & Co., 2001) xxviii.

¹¹ Mark Tribe in Manovich xiii.

¹² Paul 7. (See also 212-214.)

¹³ Manovich xxxi.

¹⁴ Rachel Green, *Internet Art* (London: Thames & Hudson, 2004) 20.

¹⁵ Manovich xi-xii.

¹⁶ Paul 33.

¹⁷ Greene 191.

¹⁸ Greene 30-31.

¹⁹ Quoted in Greene 23.

²⁰ Manovich xi-xii.

²¹ Sheree Scarborough, “Visualizing Identity iTour” *State of the Arts* (publication of the University of Texas at Austin College of Fine Arts) Issue #25, Spring 2004, 3.

²² Green 83-84.

²³ Christian Moeller, *A Time and Place, Christian Moeller Media Architecture, 1991-2003* (Baden, Switzerland: Lars Muller Publishers, 2004) 149.

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- ²⁴ Ellen Wolff, "A Room with a View" *Video Systems*, May 1, 2002. Available online at <<http://www.videosystems.primediabusiness.com>>
- ²⁵ Yasumasa Morimura, *Daughter of Art History* (New York: Aperture, 2003) 123.
- ²⁶ Michael Rush, *New Media in Late 20th-Century Art* (London: Thames & Hudson, 1999) 185-86.
- ²⁷ Dana Self, *Bruce Yonemoto, Screen Gems* (Kansas City, MO: Kemper Museum of Contemporary Art, 2002) n.p.
- ²⁸ Donna Haraway, *Simians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991) 163.
- ²⁹ , Haraway 164.
- ³⁰ Victoria Vesna, "Mind Shifting and Future Bodies: from Networks to Nanosystems" On the artist's website: <<http://vv.arts.ucla.edu>>
- ³¹ Greene 115.
- ³² Greene 185, image 160.
- ³³ Greene 187.
- ³⁴ Rush 204.
- ³⁵ <<http://nano.arts.ucla.edu>>
- ³⁶ Paul 142-44.
- ³⁷ Heath Bunting home page <<http://www.irational.org/irational>>
- ³⁸ Green 35.
- ³⁹ Green 51.
- ⁴⁰ Paul 189.
- ⁴¹ Oliver Grau, *Virtual Art, From Illusion to Immersion* (Cambridge: MIT Press, 2003) 29.
- ⁴² Grau 42.
- ⁴³ Erik Larson, *The Devil in the White City* (New York: Vintage Books, 2003) 5.
- ⁴⁴ Quoted in Char Davies's 1995 video *Osmose*. See <<http://www.immersence.com>>
- ⁴⁵ Grau 204.
- ⁴⁶ Grau 204.
- ⁴⁷ Paul 130.
- ⁴⁸ Grau 232.
- ⁴⁹ Paul 128-29.
- ⁵⁰ Paul 212.
- ⁵¹ Manovich xxxiii.
- ⁵² Stafford and Terpak 115.