NEW ORLEANS

SIGGRAPH 2000

Electronic Art and Animation Catalog

Computer Graphics Annual Conference Series, 2000
A Publication of ACM SIGGRAPH

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Art Gallery

Diane Gromala
Georgia Institute of Technology

Computer Animation Festival

Joe Takai
Industrial Light + Magic

Computer Graphics Annual Conference Series, 2000
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Contents

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Diane Gromala
Michael Joyce
Janet Murray
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Noah Wardrip-Fruin
Adrianne Wortzel

Introduction

Just as the mechanically curious might take apart an engine to see how it works, artists often dissect and reassemble culture in innovative and enlightening ways. Ways that enable us to think, feel, and view our everyday experiences again. Through new eyes. Beyond our ordinary bandwidth.

The SIGGRAPH 2000 Art Gallery presents a diversity of over 70 artworks to the international computer graphics community. The work represents a continuum of artworks that utilize technology in some way. Some pieces represent traditional forms of art and design, such as painting, drawing, photography, sculpture, artists' books, and jewelry. Other artworks represent forms of interactive art that are increasingly embraced by the mainstream art world: interactive installations, Web-based and multimedia projects, 3D animation, and computer-mediated performances. The annual SIGGRAPH Art Gallery attracts the most experimental work: mutant forms that refuse easy artistic categorization. In these mutant forms, powerful and hybrid imagery, concepts, sound, performances, and writing are imperceptibly intertwined with innovative uses of emerging technology. The art and technology are inseparable.

Participants interact with each other, with digital beings, and with objects via intriguing means: gesturing and talking to artificial life forms, manipulating video "eyestalks," moving toward "smart" and sassy robotic appliances, touching seemingly huge but real microscopic insects. Approach some "paintings," and you will be transported into another world.

Some of the works utilize features unique to the Web to create a sense of community, connectivity, and interactivity. Gaming is redefined, fostering unique social interactions. Users navigate digital Web movies, and remix sounds and texts to create original compositions, blurring the borders between spoken, written, and sculpted artistic forms. Performers "squat" on reflector sites, with audience members and with remote performers. All are strong examples of electronic art delivered on the Web and extended into the physical plane.

Each artist takes a unique approach to generating 2D artwork digitally. The show includes digitally inspired painting; collages; algorithmically generated image components; images created with X-rays, MRIs, CAT scans, in 3D software, or in virtual reality by petting actual human beings, head-to-toe. A wooden mirror responds with hundreds of tiny motors. The variety is tantalizing.

The Art Gallery is present in many areas of SIGGRAPH 2000: within the gallery space, in nearby programs (The Studio, the Creative Applications Lab, SIGGRAPH TV, and Emerging Technologies), and in art-related presentations in Panels, Sketches & Applications, and Special Sessions.

Within the Art Gallery

Experienced docents guide tours through the gallery, providing insights into the artists' visions and methods. In gallery talks throughout the week, the artists themselves offer further insight and opportunities for direct interaction with attendees.

The Art Gallery Integrates with Its Surroundings: The Studio, the CAL, SIGGRAPH TV, Emerging Technologies

The Art Gallery space is surrounded by related programs that extend and enhance its integration with the diversity of the SIGGRAPH community. The Studio provides artists access to technologies that may otherwise lie beyond their reach: from rapid-prototyping 3D machines to large-format printers whose outputs are enormous canvases. Each day, the work produced in The Studio is juried by artists, with the day's selection exhibited in the Art Gallery. Artists can demonstrate their processes and techniques in the Creative Applications Lab. SIGGRAPH TV provides up-to-the-minute, televised information about art that is, in and of itself, art. The boundaries between the Art Gallery and Emerging Technologies are intentionally indistinct, reflecting our attitude that what constitutes art is sometimes radically innovative uses of technology.

The Art Gallery Extends to Panels and Special Sessions

Art Gallery talks culminate in two panels: No Art Jargon, where artists engage the technical community in discussions of using or subverting computer techniques, and Interactive Narrative. And two Special Sessions, Fiction 2001 and Art & Culture Papers, complement and extend Art Gallery discussions. The Art & Culture Papers published here will also appear in the journal "Leonardo."

The SIGGRAPH 2000 Art Gallery presents works that inspire, provoke, and engage the wider SIGGRAPH community by exploring new connections between mind and body, the human and the technological, the aesthetic and the critical. Works that provoke, challenge, and enable us to re-experience, re-examine, and make sense of our bodies, our technologies, and our culture. Works that enable us to replenish the spirit and heighten the sense of the world outside of us.

Diane Gromala
SIGGRAPH 2000 Art Gallery Chair

Digital Ontologies: The Ideality of Form in/and Code Storage - or - Can Graphesis Challenge Mathesis?

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The attempt to understand the connections that link human thought to its representation through the act of formgiving (in language, image, or signs) is central to Western philosophy and aesthetics. In every generation, some version of this question has been posed: If it were possible to understand the logic of human thought, would there be a perfect representation of it in some unambiguous, diagrammatic symbol set of entities and dynamic relations among them? Informed by classical metaphysics and philosophy, this question also has a life not only in contemporary struggles that are carried on in the varied and very different domains of visual art, information design, and computer graphics, but also in cognitive science, with its legacy of symbolic logic, artificial intelligence debates, and a disposition towards the intersection of speculative and specifiable apprehensions of what constitutes thought.

A corollary, crucial issue within western metaphysics is whether an idea can exist outside of material form and yet appear to human perception. Are there forms that are grasped by the human mind and even communicable to a community of persons even though they exist without material instantiation — abstract concepts of law, love, justice, or spirit, for instance, or rather more concrete-seeming forms within the language of geometry, art, or social behavior ("good form")? And does this question take on a new cast when the basic issue of whether an idea can exist outside of instantiation in material form is posed with respect to the digital environment? Is our conception of an image profoundly changed by its capacity to be stored as digital code? Or is the commonality of code storage as the defining condition of digital processing a confirmation of a long-standing western philosophical quest for mathesis, in which there ceases to be any ambiguity between knowledge and its representation as a perfect, symbolic, logical mathematical form? To provide a framework for my discussion, I want to invoke two somewhat disparate positions within 20th century philosophy: Edmund Husserl's notion of the "ideality of Form" and Theodor Adorno's problematizing of the notion of self-identity of form and the social-political implications of same.

Both of these notions need clarification, at least to the extent of an introductory paraphrase, in order to justify their use as poles of reference for examining the ideological underpinnings on which digital imaging is to some extent premised. Specifically, they are useful as a way to address the assumptions of positivism underlying the authority of digital media as construed in the popular imagination. Though my focus is on the cultural authority granted to such a positivist conception, the premise on which this authority is sustained is a philosophical one, as I hope to demonstrate. A discussion ranging between Husserl's ideality and Adorno's self-identity allows the link between the idea of "data" and the actual materiality of its existence in digital form to be interrogated critically, though this link is often overlooked in the rhetoric of electronic cyberspeak, where data has somehow mistakenly come to carry an aura of immateriality as a feature of its fundamental identity. As a consequence, that identity has come to be conceived of in a relation of identicality — of information to itself. This is always a dangerous notion, Adorno will be quick to warn us, since it precludes any critical intervention in the investigation of terms of being and their reception in cultural frameworks, where they operate in rather more pedestrian guise, rather like gods in mortal embodiment in Greek mythology, since their potency among humans warps the scale of power even in daily practice and then radically and swiftly on disclosure.

The working concept of "ideality" in my argument is based on Husserl's suggestion that in the origin of geometry there is an "ideality" of form which can exist outside of material but still be apparent to and apprehended by a cognitive sentience. He makes this argument specifically in reference to geometric forms, whose existence becomes apparent to human sentience and yet is not dependent upon it (as opposed to, for instance, the form of the story of Emma Bovary, which is dependent on human authorship even if it can live as an idea outside of the text). Husserl suggests that the peculiar specificity of geometric forms is that although they become conventionalized within human representational systems, the original condition of their existence is not dependent on human constructs, a topic he explores through the dilemma of "the first geometer whose apperception of geometric forms is an initial confrontation with their ideality (that is, as forms outside of material).

But if geometric forms exist independent of human perception of them, and, in fact, are not changed or altered by that perception from their ideal form, then does that ideality necessarily fall into the category of "self-identity" or "unity" of form, which is anathema to Adorno? It is anathema because when empirical and/or positivist logic invades culture to such an extreme that representation appears to present a unitary truth in a totalizing model of thought, then that leaves little or no room for the critical action or agency that are essential to any political basis for agency.

These two frameworks define the poles within which I will examine the premises on which "mathesis" functions in current conceptions of digital data. I suggest that there is an underlying, or even overt, positivist ideology in the way the myth of digital code is being conceived in the public imagination. Further, this gives validation to digital representation on the basis of that premise in a way that forecloses interrogation of that premise. My double agenda is to disclose the ideological assumptions in the way the ontological identity of the digital image is posed and to suggest that graphesis (embodied

information) can challenge mathesis. Or, to paraphrase, I assert that the instantiation of the form in material can be usefully opposed to the concept of image/form and code storage as a single, unitary truth. The crucial point is that this is true even of the digital itself, not merely of what it represents; thus I would strongly assert that the real materiality of code should replace the imagined ideality of code.

To focus this discussion, I want to concentrate on the issue of digital images since many of the questions about the truth, fiction, or simulacral identity of digital imagery have been asked in the name of the presumed distinction between traditional darkroom photography and digital photography. I want to compare, for instance, a recent digital image by artist Peter Campus with the fictions produced by those two young, early 20th-century adolescents Frances Griffiths and her friend Elise Wright, whose paper cutouts of fairies, expertly photographed by them in a garden setting, passed as sufficiently real to elicit great debates. "Alice and the Fairies" (1917) is just such an image, in which the inconceivability of deceit is linked as much to cultural expectations about the innocence of adolescent girls as it is to the credibility of fairies'actual existence in English gardens. Peter Campus's "Wild Leaves" (1995), with its digitally manipulated visual information, is more simulacral than fictional (it is about surface image as effect, not narrative credibility), but it is a mere half-step from the photographic antics of the young women to those of Campus. Any number of critics have pointed out that there is much more continuity than discontinuity in the shift from darkroom to digital. The notion that photographic truth was based on a pure, unmediated representation of a "real" referent was shattered even earlier than Griffith/Wright's loss of innocence, since the use of multiple exposures, multiple negatives, and alterations of the plate in blatant reworking of the metaphysically endowed-with-truth "light" let in by the lens, as well as careful manipulation of the exposure and print, were all tools of the photographer's trade almost from its origin in the early 19th century.

This argument can be pursued and nuanced, following Hubertus Amelunxen's discussion, by contrasting the two types of mimesis defined by Plato: eikon/likeness and semblance/simulacral and the distinctions these terms allow in the discussion of photographic imitation of light/life as truth. In brief, the contrast is between the indexical traces of actual light and the codes of verisimilitude that come to occupy a position of cultural authority dominating ideas of what truth "looks like." I'm not particularly concerned to pursue the upped ante and constant trumping of the realm of increasing degrees of virtuality and hallucinatory reality that continue to evolve. The skills and entertainment-industry values that successfully deceive (some) of the senses raise philosophically charged questions. But I want to pursue the simpler, more fundamental question of assumptions about the truth value assigned to digital images as code.

Because unlike traditional photographic "truth" (darkroom or digital varieties), the "truth" of the digital image isn't, I would argue, posed as an index to the instant of exposure or as encoding the experience of "natural" visual perception as it has been familiarized by the camera. As has been well established in critical discussions, the digital image, photographic or not, is removed from the mechanics of production in which that metaphysics of light is linked to the punctum moment of revelation that connects it indexically and temporally to reality. But nonetheless, the digital image is (popularly and fundamentally) conceived as a truth of another kind that is premised on a deep conviction about the relations of reason and truth, a rational link between mathematics and form, in which the identity of a mathematical formula is supposed to exist irrefutably, absolutely, as an indisputable truth. This is the positivist premise, the foundation of a digital ontology linked to a belief that mathematical code storage is equal to itself, is a truth identity irrespective of material embodiment.

Now, it's interesting to step back from this and approach the question of representation of thought as form through another trajectory, one in which the link of truth and form is posed as a relation of identity. In the first decade of the 20th century, Annie Besant, a psychic, produced a series of drawings of "thought forms" (published in a volume with the same name, 1905). There is a distinct naïveté in this work, seen from historical perspective, and yet there is also a purity in her conviction that thought is form and can be directly manifest. Her work, conceived within a late 19th century sensibility that extended into the early 20th, took its points of departure from a discourse of the "psychic" that embraced telepathy, magnetism, and the role of a medium. She saw, or at least presented, this work as a set of images that attempted to understand and represent the ontology of form as a direct expression of mind. Her images suggest that the representation of thought must be situated within a human context for its form to be understood. The forms might transcend any individual's existence, and be generalizable into a typology of universals (her categories, radiating affection, animal grasping affection, watchful anger, and jealous with anger, are typical of her time, a legacy of a theory of types and forms, combined with a vocabulary of late 19th-century psychology). But underlying her work are precepts that unite the research she pursued to that of cognitive science, with its quests for generalizable precepts that might be elaborated in a typology of forms and processes.

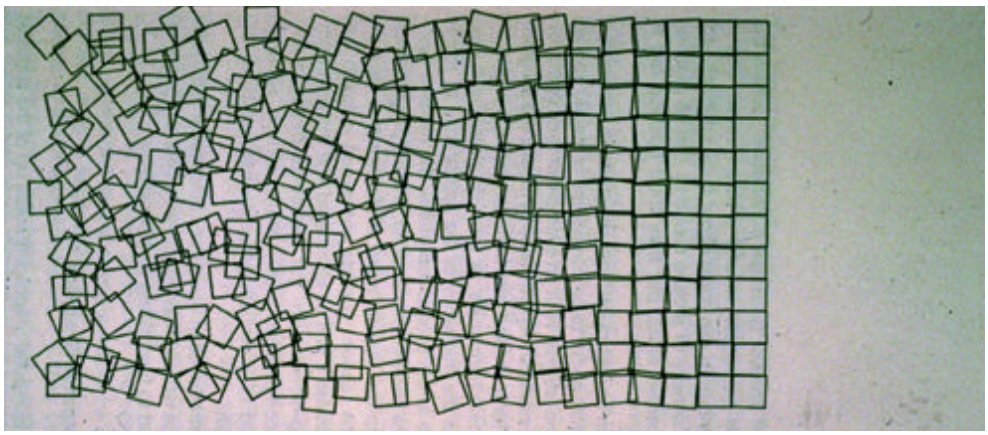
Besant's visual forms, schematic and modeled, have a formal resonance with a number of early computer-generated graphics, such as the simple images produced by Jack P. Citron in the 1970s. In their minimal, skeletal form, these graphics have a pristine innocence to them that makes them attractive to revisit, especially as they embody one major strain of computer graphics work, and Citron's "Geometric digital graphic from a curve" is an image in which the algorithm precedes the visual image, and the mathematics and logic of thought that creates

both algorithm and its manifestation are conceived of as thought beyond the philosophical frame of human subjectivity. The Citron image stands in relation to the algorithm as the Copy does to Idea (eidilon) in a Platonic scheme (even as the more debased Phantasm which is a copy of a copy), since presumably Idea has a stable, fixed existence that suspiciously resembles an algorithm in our thinking. Thus Citron's idea is radically different from Besant's in both kind and form, content and ontological condition of being, but in its capacity to function schematically, as a form with a graphic identity that presumes to be a manifestation of ideal form, it has much in common with Besant. It is true that as a digitally produced and manipulated entity, Citron's algorithm is also stored in material, lodged in silicon, through a sequence of instructions and address codes, but like the "ideality" of Husserl's geometric forms, these algorithms seem to be capable of appearing to sentience, of being apprehended, outside of a material form — as thought.

Interestingly, Citron's work presents another aspect, since it engages with the theme of algorithm and distortion as a process of deformation from the mathematical ideal of a geometric form through distortion and manipulation of its formulaic stored condition. This theme was the subject of a number of other works from the early 1970s, almost as if the very essence of the problem of form as mathematical ideal and form as instantiation were paradigmatic issues for computer graphics. George Nees's "Random number generator causes swaying" maps a distortion in a regular pattern caused by introducing the random element that deforms it, and the Japanese CTG group's 1971 "Return to Square" is almost a poster image for the nice comfortable fit between the ideality of the square as order and the process of debasement by which it is transformed into a (material) image. The algorithmic representation of the geometry is the pure code, the ideality, and the material graphic representation demonstrates the degradation that affirms the old Platonic hierarchy of Idea and Copy and Phantasm.

But there is a fundamental flaw in this mode of thinking about form in an opposition of algorithm and graphic manifestation, or of geometric idea and encoded algorithmic equivalent. And this is that it is the manifestation into substance, the instantiation of form into matter that allows some thing, any thing, to be available to sentience. This is true for the conceivably inherent visuality of a square, but also of the sort of imagery made by scientists Zhe Zhang and Charles Leiber when they were using computer-generated images of an atomic resolution view of the surface of the superconductor niobium dissellenide 269. The presumed ideality of the actual (!) molecular structure is here made apparent as an image. It might pass as a convenient fiction through which we can gain access to the mathematical "truth" of the image, but the digital image of something that is fully simulacral, such as the monster frog from Peter Gabriel's video "Mindblender refuses any easy analogy of algorithm and reality as a fundamental unity. The existence of the image depends heavily on the display, the coming into matter, in the very real material sense of pixels on the screen. If, in one instance, the graphic display is manipulated by the algorithm, then, in other instances, the display becomes the site for manipulation of the algorithm. In a weak, organic analogy to snowflakes, or some new-age Heraclitan observation, it's fair to say no two pixels are alike and that the instantiation always bears in its material embodiment the specificity that makes for difference from the code.

Which brings me to the crux of the matter. What is the "information" invoked or suggested in any of these instances: the information of an algorithm, a geometric form, an imagined molecule given visual expression, a simulacral monster image whose algorithmic reality, such as it is, follows from the manipulation of data in visual form on the screen? In the visual practice of an information design, in which graphic artists create schematic versions of the history of philosophy using motifs of an imagined solar system, or thermal conductivity is mapped with fine, schematic precision, the assumption is that the information precedes the representation, that the information is other than the image and can be revealed by it, served by an accurate visual presentation. But form is constitutive of information, not its transparent presentation.

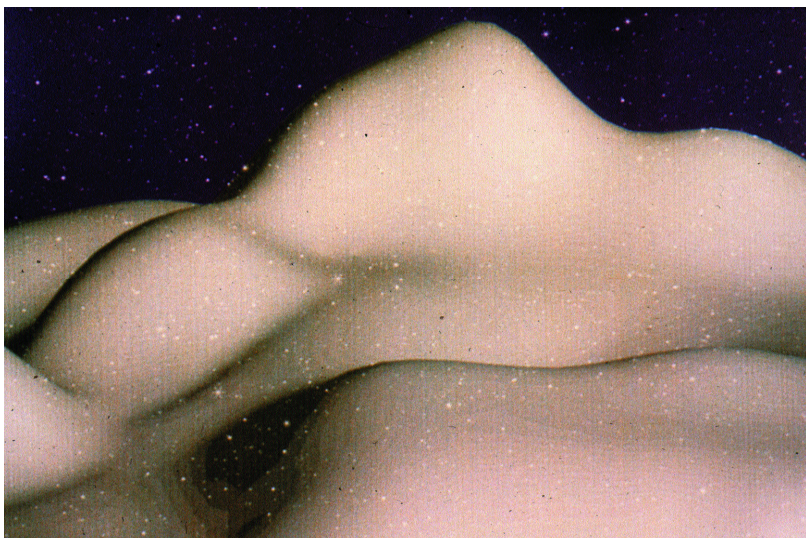


Perhaps the most compelling, chilling image that I have come across in thinking about these issues is a computer-generated graphic by the artist-scientist Melvin Prueitt, created also in a pioneering phase of such work. It is a nocturnal image of a field of snow, unbroken and undisturbed, a terrifying (to my mind) image of digital purity manifest in its full sterile wholeness, as if the image is a completely pure, pristine visual manifestation of code. It's not, of course, as a glance at an image of any plotting pen or computer output device, laser jet or printer, would make clear. The very acts of production and inscription, the scribing of lines of difference that create the specificity of an image, demonstrate the making of the form as an act of differentiation from the mathesis (code). Whatever the "ideality" of code may be, even if it were, as it is not yet at least, directly available to sentience in some unmediated way, it is in the encounter of matter and mind that form is produced as thought (and thought as form).

Even more important, however, in thinking of the way the code lurks behind the Prueitt image of snow (pick the metaphor of spatial and/or temporal relation that describes some presumed anteriority and independent existence for the algorithmic basis) it is crucial to remember that that code, however conceived, is not "pure if purity suggests some independence from a material substrate or instantiation into material. Code is also, always, emphatically material, not pure.

So does the digital encoding of form as information, as data, as patterns of binary code, ultimately shift the understanding of what a "form" is toward the realm of "mathesis that tradition of logic envisioned by Leibniz that is still driving cognitive, epistemological, and technical inquiry beyond the 20th century? I would argue that the "ideality" which Husserl envisions is highly generalized and reductive, a mere category and place-holder within the cognitive system (even if assumed to exist in some ontological sense outside cognition), rather than a replete and specific "form" in the sense that word is understood by artists. This line of argument allows that the idea of "graphesis" (defined as knowledge manifest in visual and graphic form) understands "form" as highly replete, instantiated, embodied, discrete, and particular.

As a final contrast, consider a neo-classical image of The Invention of Drawing, of the act of formgiving, by 18th-century painter Karl Fredrich Schinkel, which inverts (perversely) Pliny's tale of Dibutades, the daughter of the potter, tracing the outline of her departed lover and changing it into an image of female beauty objectified and reified as an ideal by the male gaze. This is an image of aesthetic form-giving as inadequate copy, as lesser truth than the real. Then consider an advertisement for Johnny Walker Red Scotch, from the late 1990s. In the ad, a sockless but well-heeled young man sits in khakis and topsiders on a deck, beachside, with his laptop open in front of him. On his screen, is a wireframe graphic of a dolphin, the beast itself, leaping up and out of the Johnny Walker Red sea. The image on the screen and the image in the ocean don't match. Their directions, temporal moment, and other details are out of synch. But which is bringing the other into being? In this instance, the visual image confuses the hierarchies of original and copy. The computer graphic seems to generate reality or, at the very least, function on an equal, autonomous level as a form-producing environment. Paul Virilio, in "The Vision Machine creates a specter of a sightless visuality, one in which image exists as uploaded signal in the codes/currents of a closed system of information processing,



a "non" visible legibility of information readable by and for machines. In such a situation, form is only code signal, material in its own existence, participating in the production of some "other" sentience than the human. Whether such contexts have use for or attend to the materiality of code storage is a matter for open speculation.

But what is at stake is not the question of whether there is a "truth" to this idea that the stored "code" exists and can be made use of without graphic manifestation, and that it is stored, materially. What is at stake is that this idea pushes the cultural status of the digital to a place of mythic "mathesis in which the sense of an inevitable and seamless interchangeability replaces the idea of a differentiated and resistant material instantiation of form.

Such arguments have implications in how the transformation of "form" from traditional media and representational systems into digital formats do or don't privilege aspects of these forms as "information" to be encoded (what gets lost in translating a text into ASCII format, for instance). The tension between mathesis and graphesis returns us to the problems of form pondered by Adorno. His critique of instrumental rationality can be aptly brought to bear on the ways in which digital media depended upon an unquestioned assumption of mathesis as their premise for understanding information. If "form" is conceived in mathematical terms, it can be absorbed into an absolute unity of essence and representation, while if "form" is conceived in terms of graphesis, then it resists this unity in part through the specificity imparted by material embodiment. This materiality cannot be fully absorbed into (or made one with) the "ideality" of form as idea, ideal, or "pure" code. Digital media have their own materiality (and material history to be sure), but it is in the gap between mathesis and graphesis that the resistance to the totalizing drive of the digital can be articulated.

I return, for a final moment, to the Prueitt image of digital snowfields, in which, as Amelunxen says of such work, the algorithmic-numerical image is separated from its origin so that there is "no shadow" cast by the space between origin and image, original and manifestation. The crisis is not, as commonly discussed, a crisis of the copy, of originality, or of authenticity or truth. No, the argument that must be made is for an investment in reinscribing, in always inscribing, form into matter as part of a human, cultural, and social system in which that condition of materiality permits and allows and/or requires a critical consideration of the ways it actuality participates in and helps replicate cultural mythologies and their of code as truth, as if the easy and complete interchangeability of image into code and back into image is an image driven by a myth of techno-superiority, of a truth so fundamental it is never questioned. In mathesis, code presumes self-identity as a premise, with no critical distance, in a system in which everything is reduced to data and equivalents. Mathesis makes this claim, and when it makes this claim within the cultural realm of representation, then it needs to be beaten back into its place — a kind of whack the mole approach to overreaching ideology — since its claims presume a premise that brooks no interrogation. Graphesis, on the other hand, is always premised on the distinction between the form of information and information as form-in-material. Graphesis is premised on the irreducibility of material to code as a system of exchange; it is always a system in which there is loss and gain in any transformation that occurs as a part of the processing of information.

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Expressive AI

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The field of Artificial Intelligence (AI) has produced a rich set of technical practices and interpretive conventions for building machines whose behavior can be narrated as intelligent activity. Artists have begun to incorporate AI practices into cultural production — into the production of artifacts and experiences that function as art within the cultural field. In this paper, I describe my own practice of AI-based cultural production: expressive AI. I will attempt to provide a preliminary understanding of this practice by both situating expressive AI with respect to other discourses on AI and by working inductively from my own AI-based art work. I will first provide a brief description of three of my AI-based art pieces. These will serve as concrete examples to ground the rest of the discussion. I will then describe the expressive AI practice by first situating it with respect to the GOFAI/interactionist AI debate, then by describing the central organizing metaphors of authorial and interpretive affordance, and finally by providing a preliminary set of desiderata for expressive AI practice.

Three AI-Based Artworks

This section describes three of my AI-based artworks. In these brief descriptions, I've combined a discussion of both the concept of the piece and the technical implementation. Both artists and AI researchers are likely to find these hybrid descriptions unsatisfying. However, these hybrid descriptions are necessary in order to ground the discussion of the practice of expressive AI.

Subjective Avatars

The goal of the Oz project[3] at Carnegie Mellon University is to build dramatically interesting virtual worlds inhabited by believable agents—autonomous characters exhibiting rich personalities, emotions, and social interactions. In many of these worlds, the player is herself a character in the story, experiencing the world from a first-person perspective. Typically, the player's representation within the world (her avatar) is passive. The avatar performs actions as fully specified by the player and reports events (by, for example, rendering a 3D scene or generating descriptive text) in a pseudo-objective manner (pseudo-objective because any description encodes the bias of the world author). An alternative is a subjective avatar[17] (an avatar with autonomous interpretations of the world).

Why subjective avatars?

I want the user to step into the shoes of a character and experience a story from this new perspective. In this manner, the user gains an empathic understanding of a character by being this character. In non-interactive drama (movies, theater), an audience is able to gain insights into the subjective experience of characters precisely because the experience is non-interactive; the characters in the drama make decisions different from those that audience members might make. In an interactive story, how will a user gain insight into the character she is playing when she is controlling this character's actions? If she were to immediately begin acting out of character, she will derail the story, effectively preventing any insight. With a subjective avatar, the hope is that if the user's avatar filters and interprets the world in a manner consistent with the character, the user will begin to feel like the character, gaining a deeper understanding of the message the author wants to convey. The avatar becomes an additional artistic resource for authorial expression.

I've experimented with subjective avatars within the Oz text-based world. The text-based world accepts commands from the user and presents the world to the user in a manner similar to text-based adventure games.

Subjective state

In order for the avatar to provide a subjective interpretation for the player, it responds to activity in the world by maintaining subjective state. Currently, the avatar's subjective state consists of emotional state (emotional responses to events) and story context.

To maintain emotional state, I make use of Em,[20] the Oz model of emotion. Em is integrated with Hap,[14] a reactive-planning language specifically designed for writing characters. In Em, emotions are generated primarily in response to goal-processing events and attitudes. In order for the avatar to have goal processing emotions, it must be processing some goals. Since the avatar doesn't directly take action on its own, its goals are all passive. Passive goals wait for some event to occur in the world in order to succeed or fail.

In addition to emotion processing, the avatar keeps track of where it is in the story. This is done to organize the avatar's goals and simplify the writing of behaviors. At different points in the story experience, the same event may cause different reactions in the avatar (or no reaction).

Narrative effects

Once the avatar is maintaining a subjective state, it must express this state in such a way as to affect the user's experience. The primary effect I've experimented with is manipulating sensory descriptions. Sensory manipulations are implemented as a set of Hap behaviors which render descriptions of events as a function of the subjective state. For example, imagine that the player-character (the character controlled by the human user) is afraid of a character named Barry. Barry, a manager in a fast food restaurant, is about to chew out the player. Without the subjective avatar, this would be rendered as follows in the Oz text-based world: "Barry is speaking to you. Barry's voice says 'wait a minute there, buster.'Barry goes to the counter area. Barry is no longer in the window area." The subjective avatar I've implemented for this world would render this exchange as follows: "With a vindictive gleam in his eye, Barry snaps 'Wait a minute there, buster.'Barry marches toward you from the drive-up window station." This description is

generated by a narrative rule that matches on the current subjective state of the avatar (in this case, fear), and the current activity in the world. The important thing to note is that the same "objective" events in the world (Barry saying "wait a minute there, buster" and walking toward the player) would be rendered differently if the avatar felt differently (for example, as a result of previous events in the experience).

Subjective avatar as expressive resource

A subjective avatar is like an inverse user model. A user model watches a user's actions so as to learn a model of the user. A subjective avatar, on the other hand, has an author-given model of a character. The avatar actively manipulates a user's experience so as to try and make the user feel the same way as the character. The avatar thus becomes an active expressive resource available to dramatic world authors.

Office Plant #1

Walk into a typical, high-tech office environment, and, among the snaking network wires, glowing monitors, and clicking keyboards, you are likely to see a plant. In this cyborg environment, the silent presence of the plant fills an emotional niche. Unfortunately, this plant is often dying; it is not adapted to the fluorescent lighting, lack of water, and climate-controlled air of the office. Office Plant #1[4] is an exploration of a technological object adapted to the office ecology, which fills the same social and emotional niche as a plant. Office Plant #1 (OP#1) employs text classification techniques to monitor its owner's email activity. Its robotic body, reminiscent of a plant in form, responds in slow, rhythmic movements to express a mood generated by the monitored activity. In addition, low, quiet, ambient sound is generated; the combination of slow movement and ambient sound thus produces a sense of presence, responsive to the changing activity of the office environment. OP#1 is a new instantiation of the notion of intimate technology — a technology which addresses human needs and desires as opposed to a technology which meets exclusively functional task specifications.

Comparable in size to a generic office plant (10 x 10 x 33 inches), OP#1 consists of a large bulb surrounded by metal fronds mounted on a base. The bulb, a hammered aluminum sphere, can open and close. Mounted on a stem, it can also rise above the fronds and remain in any intermediate position. The fronds, made of copper wire, sway slowly, moving individually or in synchrony. In addition to physical movement, OP#1 has a voice; it produces sound using a speaker housed in the bulb. These sounds provide the plant with a background presence. The force-delivering stepper motors are concealed in the lower part of the plant, discernible, though, through semitransparent plexiglas. The window in the bottom of the base would promise to reveal the inner workings of the plant, but shows, instead, a scene composed of rocks, sand and moving counterweights: the datarium. The datarium is the equivalent of a vivarium. In the datarium, however, the only life forms are data driven lead counterweights moving in and out of the rock and sand garden.

OP#1 is an experiment in building a companion agent — an agent that is always present, monitoring and commenting on user activity. As a constant companion, OP#1's actions must be subtle; an overactive agent would quickly becoming irritating to a user. OP#1's design attempts to maintain an air of mystery, providing a recognizable physical manifestation of a user's email activity, but not by means of a simple one-to-one mapping. OP#1 should provide the user with an opportunity for contemplative entertainment, opening a window onto the pattern of a user's day.

OP#1's primary view of users'activity is via their email. All incoming email is assigned labels which correspond to the social and emotional role of the message, such as FYI, intimate, chatty, request, etc. Any one email may be assigned several labels. Categorization is performed by means of Naïve Bayes and K-nearest neighbor text classification.[19] Naïve Bayes classifications are made by applying Bayes'law to the conditional probabilities of word occurrence given a document class and the prior probabilities of document classes. The prior terms are obtained by observing frequencies in labeled training data (an offline learning step). K-nearest neighbor classifications are found by returning the majority label among the K-nearest neighbors of the query document in the document space.

The plant's behavior is controlled by a Fuzzy Cognitive Map (FCM).[13] In an FCM, nodes representing actions and variables (states of the world) are connected in a network structure (reminiscent of a neural network). At any point in time, the total state of the system is defined by the vector of node values. The action associated with the action node with the highest value is executed at each point in time. The values of nodes change over time as each node exerts positive and negative influence (depending on connection weights) on the nodes it is connected to. As email is classified, activation energy is given to appropriate nodes in the network, priming OP#1's dynamics.

OP#1 is a collaboration with roboticist and artist Marc Boehlen.

Terminal Time

Terminal Time[9,15] is a machine that constructs ideologically biased documentary histories in response to audience feedback. It is a cinematic experience, designed for projection on a large screen in a movie theater setting. At the beginning of the show, and at several points during the show, the audience responds to multiple choice questions reminiscent of marketing polls. Below is an example question:

Which of these phrases do you feel best represents you:
A. Life was better in the time of my grandparents.
B. Life is good and keeps getting better every day.

The audience selects answers to these questions via an applause meter. The answer that generates the most applause wins. The answers to these questions allow the computer program to create historical narratives that attempt to mirror and often exaggerate the audience's biases and desires. By exaggerating the ideological position implied in the audience's answers, Terminal Time produces not the history that they want, but the history that they deserve.

Critique of traditional historical narratives

Terminal Time is an exploration and critique of familiar authoritarian narratives of history. Representation is at the heart of this endeavor. The mission is to dramatize to the viewing public that the truth of history is not simple and linear. Although there are undeniable historical facts, perspective is a critical element of historical understanding. By creating fact-based histories, clearly driven by point of view, the project reveals the constructed nature of all historical representation, in particular the popular genre of the television history documentary.

Representation in Terminal Time

Terminal Time represents ideological bias using a goal-tree formulation of ideology similar to Carbonell's.[7] The goal tree is modified as the audience answers the polling questions. Pursuit of goals in the goal tree causes the system to search its knowledge base of historical episodes, looking for episodes which can be slanted to support the current ideological bias. In addition to historical episodes, the knowledge base also contains rhetorical devices which are used to connect episodes together to produce rhetorical flow. For example, the sentence, "Yet progress doesn't always yield satisfaction," can be used to connect several episodes describing the positive effects of technological progress and several episodes that describe social or environmental problems arising from technological progress. Associated with the English sentence is a formal representation constraining the meanings that episodes before and after the rhetorical device can have. Finally, Terminal Time has a media database of video clips, still images, and sounds. Each of these media elements is represented in a searchable index. Once a narrative track has been generated, Terminal Time uses the index to select media elements consistent with the narrative track.

Terminal Time is a collaboration with interactive media artist Paul Vanouse and documentary filmmaker Steffi Domike.

These three AI-based pieces provide a concrete ground for discussing expressive AI practice. They will be used as examples throughout the rest of this paper.

The GOFAI/Interactionist AI Debate

In recent years, discourse about AI's high-level research agenda has been structured as a debate between symbolist, or Good Old Fashioned AI (GOFAI), and behavioral, or interactionist AI. The GOFAI/interactionist distinction has shaped discourse within AI and cognitive science,[5,6,8] in cultural theoretic studies of AI,[1] and in hybrid practice combining AI and cultural theory.[2,22,24] This debate has shaped much contemporary practice combining AI and cultural production, with practitioners commonly aligning themselves with the interactionist camp. Because of this connection with cultural practice, it will be useful to position expressive AI relative to this debate. In this section, I will briefly describe the GOFAI/interactionist debate, and diagnose why it is that contemporary cultural practitioners would find the interactionist position particularly compelling. Then I will describe how the goals of expressive AI as a practice are distinct from the goals of both the GOFAI and interactionist agendas.

Characterizing GOFAI and interactionist AI

GOFAI is characterized by its concern with symbolic manipulation and problem solving.[5] A firm distinction is drawn between mental processes happening "inside" the mind and activities in the world happening "outside" the mind.[2] GOFAI's research program is concerned with developing the theories and engineering practices necessary to build minds that exhibit intelligence. Such systems are commonly built by expressing domain knowledge in symbolic structures and specifying rules and processes that manipulate these structures. Intelligence is considered to be a property that inheres in the symbolic manipulation happening "inside" the mind. This intelligence is exhibited by demonstrating the program's ability to solve problems.

Where GOFAI concerns itself with mental functions such as planning and problem solving, interactionist AI is concerned with embodied agents interacting in a world (physical or virtual).[5,2] Rather than solving complex symbolic problems, such agents are engaged in a moment-by-moment dynamic pattern of interaction with the world. Often there is no explicit representation of the "knowledge" needed to engage in these interactions. Rather, the interactions emerge from the dynamic regularities of the world and the reactive processes of the agent. As opposed to GOFAI, which focuses on internal mental processing, interactionist AI assumes that having a body which is embedded in a concrete situation is essential for intelligence. It is the body that defines many of the interaction patterns between the agent and its environment.

The distinctions between the kinds of systems built by GOFAI and interactionist AI researchers is summarized in table 1.

Table 1. Contrasting properties of GOFAI and interactionist AI systems

GOFAI	*Interactionist AI*
Narrow/deep	Broad/shallow
Generality	Fits an environment
Disembodied	Embodied and situated
Semantic symbols	State dispersed and uninterpreted
Sense-plan-act	Reactive

GOFAI systems often attempt to deeply model a narrow, isolated mental capability (e.g. reasoning, memory, language use, etc.). These mental components duplicate the capabilities of high-level human reasoning in abstract, simplified environments. In contrast, interactionist AI systems exhibit the savvy of insects in complex environments. Interactionist systems have a broad range of shallow sensory, decision, and action capabilities rather than a single, narrow, deeply modeled capability.

GOFAI seeks general solutions: the theory of language understanding, the theory of planning, etc. Interactionist AI starts with the assumption that there is a complex "fit" between an agent and its environment; there may not be generic solutions for all environments (just as many animals don't function well when removed from their environment).

GOFAI divorces mental capabilities from a body; the interface between mind and body is not commonly addressed. Interactionist AI assumes that having a body which is embedded in a concrete situation is essential for intelligence. Thus, interactionists don't buy into the Cartesian split. For them, it is the body that defines many of the interaction patterns between the agent and its environment.

Because of AI's historical affinity with symbolic logic, many GOFAI systems utilize semantic symbols (pieces of composable syntax which make one-to-one reference to objects and relationships in the world). The state of the world within which the mind operates is represented by a constellation of such symbols. Interactionist AI, because of its concern with environmental coupling, eschews complex symbolic representations; building representations of the environment and keeping them up-to-date is notoriously difficult (e.g., the frame and symbol grounding problems). Some researchers, such as Brooks[5,6] maintain the extreme position that no symbolic representations should be used (though all these systems employ state, one can get into nasty arguments about what, precisely, constitutes a symbol).

In GOFAI systems, agents tend to operate according to the sense-plan-act cycle. During sensing, the symbolic representation of the state of the world is updated by making inferences from sense information. The agent then constructs a plan to accomplish its current goal in the symbolically represented world by composing a set of operators (primitive operations the agent can perform). Finally, the plan is executed. After the plan completes (or is interrupted because of some unplanned-for contingency), the cycle repeats. Rather than employing the sense-plan-act cycle, interactionist systems are reactive. They are composed of bundles of behaviors, each of which describes some simple action or sequence of actions. Each behavior is appropriate under some environmental and internal conditions. As these conditions constantly change, a complex pattern of behavioral activation occurs, resulting in the agent taking action.

Interactionist AI's Affinity with Cultural Theory

Interactionist AI and GOFAI are two technical research agendas within AI, each determining a collection of research problems and system-building practices. In this section, I examine the cultural theoretic association between interactionist AI and contemporary artistic practice.

Cultural theory is a diverse collection of literary, historical, and sociological practices concerned with understanding the metaphors and meaning systems by which culture is composed. For cultural theorists, any cultural formation can be "read" in the same manner that one might analyze a text, seeking an understanding both of the dynamic and endlessly ramifying life the formation has within culture and the ways in which the formation is a historically contingent product of a specific cultural milieu. Cultural theory undermines the distinction between "fanciful" sign systems (e.g., literature, art) which are clearly understood as contingent, social constructions, and "true" sign systems (e.g., gender definitions, perspective vision), which are generally understood as being pre-cultural (and thus existing outside of culture). Politically, cultural studies is engaged in a project of emancipation. Social inequities are supported by unexamined beliefs ("truths") about the nature of humanity and the world. For example, the inferior role of women in society is generally understood within cultural studies circles as being supported by the system of enlightenment rationality (in addition to other meaning systems). By understanding the subjugating meaning system as culturally contingent, the absolute ground from which the system operates is undermined.

Cultural theory's affinity with interactionist AI is based in a critique of Enlightenment rationality. Starting with Descartes, Enlightenment thinkers developed a theory of rationality, defining thought in terms of abstract, preferably formal operations taking place in an inner mental realm divorced from the world of gross matter. This conception of intelligence, with the twist of embedding mental operations in a material base (the brain) while still maintaining a strong split between the inner mental world and the outer world, dominates the contemporary understanding of mind. In fact, this meaning system is so hegemonic as to make it difficult to conceive of any alternative. This is precisely the kind of situation cultural theorists love to interrogate; by revealing the historical and cultural relativity (and thus rendering contingent) of the meaning system, a space of alternatives is opened up. For the case

of the Enlightenment conception of mind, this analysis has focused on revealing the ways in which interaction with the world, and particularly the notion of an embodied actor marked with a specific racial and sexual identity, was systematically marginalized. In keeping with the political project of cultural theory, this marginalization of embodiment has been seen as a theoretical support for the white, male subjugation of women and people of color. Interactionist AI, as a technical research agenda, seems to be reaching the same conclusions as this cultural theoretic project. Some cultural theorists explicitly acknowledge this alignment.[1] One result of this is that the moral energy associated with the political component of the cultural theoretic project transfers to the technical agenda; interactionist AI is associated with freedom and human rights and GOFAI with oppression and subjugation.

Much of contemporary arts practice is no longer concerned with the modernist agenda of perfecting purely formal elements. Rather, this practice involves self-consciously questioning cultural forms, representational modes and tropes, exploring the boundaries of these forms, breaking the representation, questioning whose power is being preserved by a representational mode, and hybridizing modes in order to create new ones, all from a position of extreme cultural self-consciousness. This self-conscious concern with meaning systems makes contemporary art practice and cultural theory natural allies, with many artists being informed by and participating in cultural theoretic analysis. And through this link with cultural theory many artists inherit their attitude towards AI, aligning with interactionist AI (and bottom-up methods in general) while feeling a generalized distrust of GOFAI, often accompanied with a sense of moral outrage acquired from cultural theory's political project. Contemporary artists thus come to see interactionist AI as peculiarly suited for cultural production.

Interactionist AI & Cultural Production

The expressive AI project does not view interactionist AI as possessing a privileged role in AI-based cultural production. Before describing the expressive AI agenda, I need to first disrupt this privileged position.

Agent as metaphor

Within the AI community, the interactionist/GOFAI debate is organized around the idea of an agent. Within AI, an agent is understood as an autonomous entity existing in an environment; it is able to sense and act on this environment. Historically, interactionist AI appeared as a reaction to recurring problems appearing in GOFAI in the design of complete agents and particularly robots.[5,6] In recent years the AI research community has indeed begun converging on reactive techniques for agent design, proposing a number of reactive and hybrid (combining search and reactivity) architectures for robotic and virtual agents. However, AI-based cultural production is broader than agent design. For example, while both Subjective Avatars and Office Plant #1 can be understood as agents, Terminal Time is not an agent (at least it can't be understood as an agent without broadening the notion of agent until it is vacuous), and yet is indisputably an instance of AI-based cultural production. In fact, Terminal Time makes heavy use of GOFAI techniques. An AI-based artist aligning herself too strongly with interactionist techniques may find that all her work becomes assimilated to the metaphor of agent, thus missing out on a rich field of alternative strategies for situating AI within culture.

Cultural production vs. AI

For the artist, even more important than recognizing the way that the metaphor of agency structures the interactionist/GOFAI technical debate is recognizing that both interactionist AI and GOFAI share research goals which are at odds with the goals of those using AI for cultural production. Table 2 summarizes some of the differences between cultural production and traditional AI research practice.

Table 2. Contrasting goals of cultural production and AI

Cultural production	*AI*
Poetics	Task competence
Audience perception	Objective measurement
Specificity	Generality
Artistic abstraction	Realism

Artists are concerned with building artifacts that convey complex meanings, often layering meanings, playing with ambiguities, and exploring the liminal region between opaque mystery and interpretability. Thus the purpose of, motivation behind, or concept defining any particular AI-based artwork will be an interrelated set of concerns, perhaps not fully explicable without documenting the functioning of the piece itself. In contrast, the focus in AI is on task competence, on demonstrably accomplishing a well-defined task. "Demonstrably accomplishing" means being able to show, either experimentally or by means of mathematical proof, that the AI system accomplishes the task. "Well defined task" means a simple, concisely defined objective that is to be accomplished with a given set of resources, where the objective often has "practical" (economic) utility. In GOFAI, task competence has often meant competence at complex reasoning and problem solving. For interactionist AI, this has often meant moving around in complex environments without getting stepped on, falling off a ledge, or stuck behind obstacles. In describing Office Plant #1 (OP#1) to AI practitioners (and more generally, CS practitioners), I often confront this distinction between poetics and task competence. A technical researcher tends to view OP#1 as a sophisticated email indicator that would be used to indicate to the user whether or not they should read their mail. That is, OP#1 is viewed as a mechanism for facilitating the task of reading and answering email. The notion that OP#1 is really about creating a presence whose behavior should correlate with email activity while maintaining a sense of mystery, and whose "function" is to open a contemplative window onto a "user's" daily activity, is only communicated to a technical practitioner with some difficulty.

The success of an AI-based artwork is determined by audience perception. If the audience is able to participate in the poetics defined by the artist (engage in an interpretive process envisioned by the artist), then the piece is successful. AI tries to measure success objectively. How many problems could the program solve? How long did the robot run around before it got into trouble? How similar is the system's solution to a human's solution? The artist is concerned with the subjective experience of the audience, where the AI researcher strives to eliminate any reference to human perception of their artifact. All three example AI-based artworks described above are intimately concerned with audience experience. Subjective Avatars structures a participant's experience so as to help her experience a virtual world from an alien subjective viewpoint. OP#1 creates a variable sculptural presence reflecting its owner's daily activity. Terminal Time makes visible ideological bias in the construction of history by generating biased histories in response to audience feedback. There is no audience-free vantage point from which to consider these systems.

Artists build specific works. Each piece is crafted so as to establish a specific poetics, so as to engage the audience in specific processes of interpretation. The artist explores meaning-making from the vantage point of his or her particular cultural situation. AI, like most sciences, tries to create general and universal knowledge. Even interactionist AI, while stressing the importance of an agent's fit to its environment, seeks general principles by which to describe agent/environment interactions. Where AI conceives of itself as searching for timeless truths, artists participate in the highly contingent meaning systems of a particular cultural milieu. Even those AI practitioners engaged in the engineering task of building "smarter" gizmos here and now, and who would probably demure from the "timeless truth" characterization of AI practice, are still committed to building generally applicable engineering tools. Subjective Avatars provides an example of expressive AI's focus on specificity. The characters in Subjective Avatars were built using Hap, a language designed to facilitate the crafting of specific, unique characters.[14] This is in contrast to both ALife and top-down approaches to character, which attempt to define universal character frameworks in which specific characters are "tuned-in" by adjusting parameters in the model.[18]

Finally, artists engage in abstraction. That is, they are not so much concerned with building exact replicas of parts of the world (mimesis), as with creating meaning systems that make reference to various aspects of the lifeworld (the amalgam of the physical world plus culture). On the other hand, much of AI research is motivated by realism. A GOFAI researcher may claim that their program solves a problem the way human minds really solve the problem; an interactionist AI researcher may claim that their agent is a living creature, in that it captures the same environment/agent interactions as an animal. The first time I presented Terminal Time to a technical audience, there were several questions about whether I was modeling the way that real historians work. The implicit assumption was that the value of such a system lies in its veridical model of human behavior. In fact, the architectural structure of Terminal Time is part of the concept of the piece, not as a realist portrait of human behavior, but rather as a caricature of certain institutionalized processes of documentary filmmaking.

Artistic practice transforms AI

Artistic practice is potentially concerned with a broader set of issues than the issues of agency that structure the technical interactionist/GOFAI debate. Artistic practice also operates from a different set of goals and assumptions than those shared by both interactionist and GOFAI researchers. Thus, despite the affinity between cultural theoretic critiques of Enlightenment rationality and the technical project of interactionist AI, we should be wary of any position, implicit or explicit, holding that some particular technical school of thought within AI is particularly suited to artistic practice. AI-based art is not a subfield of AI, nor affiliated with any particular technical school within AI, nor an application of AI. Rather it is a stance or viewpoint from which all of AI is reconstructed. When artistic practice and AI research combine, it results in a new interdiscipline, one I term expressive AI.

Expressive AI

AI has traditionally been engaged in the study of the possibilities and limitations inherent in the physical realization of intelligence.[2] The focus has been on understanding AI systems as independent entities, studying the patterns of computation and interactions with the world that the system exhibits in response to being given specific problems to solve or tasks to perform. Both GOFAI and interactionist AI reify the notion of intelligence. That is, intelligence is viewed as an independently existing entity with certain essential properties. GOFAI assumes that intelligence is a property of symbolic manipulation systems. Interactionist AI assumes that intelligence is a property of embodied interaction with a world. Both are concerned with building something that is intelligent; that unambiguously exhibits the essential properties of intelligence.

In expressive AI, the focus turns to authorship. The AI system becomes an artifact built by authors in order to communicate a constellation of ideas and experiences to an audience. If GOFAI builds brains in vats, and interactionist AI builds embodied insects, then expressive AI builds cultural artifacts. The concern is not with building something that is intelligent independent of any observer and their cultural context. Rather, the concern is with building an artifact that seems intelligent, that participates in a specific cultural context in a manner that is perceived as intelligent. Expressive AI views a system as a performance. Within a performative space, the system expresses the author's ideas. The system is both a messenger for and a message from the author.

Metaphors Structuring AI-Based Artwork

The concept of an AI system as communication and performance is depicted in figure 1.

The AI system (here labeled "gizmo") mediates between artist and audience. The gizmo structures the context within which the artist and audience negotiate meaning. The artist attempts to influence this negotiation by structuring the interpretive affordances of the gizmo, by providing the audience with the resources necessary to make up a story about what the gizmo is doing and what meanings the author may have intended to communicate. This relationship between gizmo, artist, and audience, is the conversation metaphor — artistic practice conceived of as a conversation between artist and audience mediated by the art "object" (the object can be something non-concrete, such as a performance).

The conversation metaphor is an example of what Agre[2] calls a theory-constitutive metaphor. Such a metaphor structures the theories and practices of a field. Every such metaphor has a center and a margin. The center is the set of issues brought into focus by the metaphor, those issues which will be considered primary in the practice structured by the metaphor. The margin is the set of issues made peripheral by the metaphor, those issues which will only be a secondary part of the practice, if considered at all. The practice may even assume that the margin will "take care of itself" in the process of focusing on the center.

The center of the conversation metaphor is the relationship between two subjects, the artist and the audience. A practice structured by this metaphor will focus on the negotiation of meaning between these two subjects. The margin is the internal structure of the gizmo itself. The conversation metaphor interprets the internal structure of the gizmo as an accidental byproduct of a focus on negotiated meaning; the structure "takes care of itself" in the process of focusing on the negotiation of meaning between artist and audience. The central and marginal concerns of the conversation metaphor reverse those found in AI research practice.

AI research practice proceeds by means of the construction metaphor. The gizmo (in GOFAI practice) or the gizmo + environment (in interactionist AI practice) is considered as a system complete unto itself, about which statements can be made without reference to either the system builders or the interpreters as subjects. Instead, system construction and interpretation is rendered as an objective process; construction is conditioned only by engineering concerns, and interpretation only by the requirements of empirical investigation. The active process of meaning making engaged in by a subject is marginalized.

Expressive AI simultaneously focuses on the negotiation of meaning and the internal structure of the AI system. These two apparently disparate views are unified by thinking in terms of affordances: negotiation of meaning is conditioned by interpretive affordances

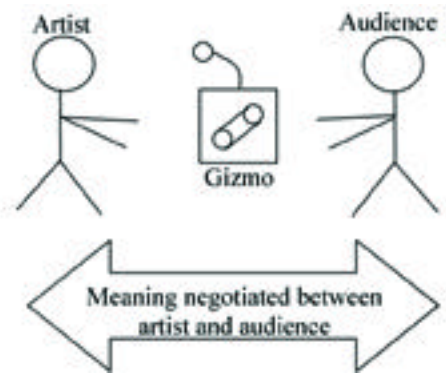

Fig. 1. The conversation model of meaning making.

and the internal structure of the AI system is conditioned by authorial affordances. Before describing interpretative and authorial affordance, it is useful to first define the more general concept of affordance.

The notion of affordance was first suggested by Gibson[11,12] as a way to understand perception and was later re-articulated by Norman[21] in the field of interface design. Affordances refer to the perceived properties of things, particularly those properties that suggest actions that can be taken with the thing. Affordances are the opportunities for action made available by an object. But affordance is even stronger than implied by the phrase "made available"; in order for an object to be said to afford a certain action, the object must in some sense "cry out" for the action to be taken. There should be a naturalness to the afforded action that makes it the obvious thing to do. For example, the handle on a teapot affords picking up the teapot with your hand. The handle cries out to be grasped. Affordances not only limit what actions can be taken (the negative form of constraint) but cry out to make certain actions obvious (the positive form of constraint).

Interpretive Affordance

Interpretive affordances support the interpretations an audience makes about the operations of an AI system. In the conversation model of negotiated meaning, it is the interpretive affordances which condition the meanings that can be negotiated between artist and audience. Interpretive affordances provide resources both for narrating the operation of the system, and additionally, in the case of AI-based interactive art, for supporting intentions for actions that an audience may take with the system.

Agre[2] describes how AI technical practice provides narrative affordances which support AI researchers in creating stories describing the system's operation. Different practices (e.g., GOFAI or interactionist AI) provide different affordances for narrating system behavior. However, in typical AI research practice, these affordances are not consciously manipulated. Rather, they serve as part of the unconscious background of the engineering practice; they co-evolve with the technical practice as a silent but necessary partner in the research. Expressive AI practitioners think explicitly about how to provide the affordances supporting the narration of system behavior. For example, Sengers[22] explicitly added transition behaviors to behavior-based agents to support the audience's ability to narrate the agent's behavior.

For interactive art, intentional affordances support the goals an audience can form with respect to the artwork. The audience should be able to take an action and understand how the artwork is responding to this action. This doesn't mean that the artwork must provide simple one-to-one responses to the audience's actions. Such simple one-to-one responses would be uninteresting; rather, the poetics of the piece will most likely avoid commonly used tropes while exploring ambiguities, surprise, and mystery. But the audience should be able to understand that the system is responding to them, even if the response is unexpected or ambiguous. The audience should be able to tell some kind of unfolding story about their interaction with the work. Both extremes, simple stereotyped responses to audience interaction making use of well-known tropes and opaque incoherence with no determinable relationship between interaction and the response of the artwork, should be avoided. See Figure 2.

A concern with interpretive affordance will be familiar to artists; negotiating meaning between artist and audience is central to artistic practice. Expressive AI adopts this concern within the context of AI-based art. But expressive AI also adopts a concern for the artifact from AI research practice.

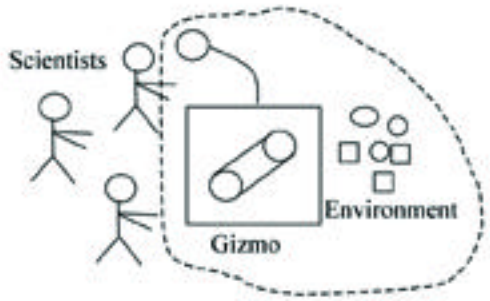

Fig. 2. The construction model of AI research.

Authorial Affordance

The authorial affordances of an AI architecture are the "hooks" that an architecture provides for an artist to inscribe authorial intention on the machine. Different AI architectures provide different relationships between authorial control and the combinatorial possibilities offered by computation. Expressive AI engages in a sustained inquiry into these authorial affordances, crafting specific architectures that afford appropriate authorial control for specific art works.

This concern with the machine itself will be familiar to AI research practitioners (both GOFAI and interactionist). However, AI research practice tends to focus on individual architectures, not on the human authorship supported by the architecture nor on understanding the differences between architectures. AI research practice downplays the role of human authorship within the system because this authorship disrupts the story of the system as an autonomously intelligent entity. Rather, the focus is on the architecture itself, independent of any "content," and generally independent of any discussion of any other architecture. Expressive AI simultaneously adopts and transforms this concern with the machine.

A focus on the machine is alien to current electronic media practice. In keeping with the conversation metaphor of meaning making, the internal structure of the machine is generally marginalized. The machine itself is considered a hack, an accidental byproduct of the artist's engagement with the concept of the piece. In the documentation of electronic media works, the internal structure of the machine is almost systematically effaced. When the structure is discussed, it is usually described at only the highest level, using hype-ridden terminology and wishful component naming (e.g., "meaning generator "emotion detector"). At its best, such discursive practice is a spoof of similar practice within AI research, and may also provide part of the context within which the artist wishes her work to be interpreted. At its worst, such practice is a form of obfuscation, perhaps masking a gap between intention and accomplishment, the fact that the machine does not actually do what is indicated in the concept of the piece.

Why would an artist want to concern herself with authorial affordance, with the structural properties of the machine itself? Because such a concern allows an artist to explore expressive possibilities that can only be opened by a simultaneous inquiry into interpretive affordance and the structural possibilities of the machine. An artist engaging in expressive AI practice will be able to build works with a depth, a richness, a sophistication that can't be achieved without this simultaneous focus on meaning making and machine structure.

Combining Interpretive and Architectural Concerns

The splitting of AI-based art practice into interpretive and authorial concerns is for heuristic purposes only, as a way to understand how expressive AI borrows from both art practice and AI research practice. Expressive AI practice combines these two concerns into a dialectically related whole; the concerns mutually inform each other. The "interface" is not separated from the "architecture" In a process of total design, a tight relationship is maintained between the sensory experience of the audience and the architecture of the system. The architecture is crafted in such a way as to enable just those authorial affordances that allow the artists to manipulate the interpretive affordances dictated by the concept of the piece. At the same time, the architectural explorations suggest new ways to manipulate the interpretive affordances, thus suggesting new conceptual opportunities.

The AI-based artist should avoid architectural elaborations which are not visible to the audience. However, this admonition should not be read too narrowly. The architecture itself may be part of the concept of the piece, part of the larger interpretive context of people theorizing about the piece. For example, one can imagine building a machine like Terminal Time in which some small finite collection of historical narratives have been prewritten. The narrative played is determined by a hard-coded selection mechanism keyed off the audience polls. For any one audience, the sensory experience of this piece would be indistinguishable from Terminal Time. However, at a conceptual level, this piece would be much weaker than Terminal Time. A Terminal Time audience is manipulating a procedural process which is a caricature of ideological bias and of institutionalized documentary filmmaking. The operationalization of ideology is critical to the concept of the piece, both for audiences and for artists and critics who wish to theorize the piece.

Why Use AI in Cultural Production?

At this point, the practice of expressive AI has been described as one combining both a focus on meaning-making and the authorial affordances of AI architectures. However, this begs the question of why an artist would want to use AI in cultural production at all. Here I enumerate some of reasons why I engage in AI-based art practice.

- Support sophisticated modes of interaction. AI-based interactive art can respond to audience interaction with a sophistication that is not possible without AI techniques. For example, with Subjective Avatars the audience manipulation of the avatar causes a complex pattern of processing to occur in a behavior model of a specific personality (whatever role the audience is "playing") resulting in an active manipulation of the audience's experience of the world.

- Procedural portraits of human meaning-making. AI techniques support the construction of procedural portraits of human meaning-making. A procedural portrait is a representation of some human cultural process. For example, Terminal Time is a procedural portrait of the ideologically biased construction of mainstream historical documentaries.

- Actively participate in the realm of human meaning. AI-based art can directly observe and act on activities laden with human meaning. For example, Office Plant #1 is able to react to the social and emotional content of email; this requires that it have some window on the human interpretation of email.

- Tap into rich history of narrative affordance. As discussed in the section on interpretive affordance, any interactive artwork must provide the resources for an audience to interpret the activities of the artwork. The technical practice of AI has a rich history of constructing machines with narrative affordances (albeit the existence of these affordances are usually not acknowledged). This practice provides a fertile field for building machines that afford complex interpretation.

Expressive AI Desiderata

Now that the practice of expressive AI has been given an abstract description, this section provides a tentative list of desiderata.

Expressive AI is not "mere applications."

Expressive AI is not "mere application Expressive AI is not an application area of AI. Applications are understood as the use of off-the-self techniques which are unproblematically appropriated to some concrete task. AI applications do not question the deep technical and philosophical assumptions that underlie AI practice. Expressive AI, on the other hand, changes AI practice by simultaneously exploring interpretive and authorial affordances. Expressive AI is not a technical research program calling for the overthrow of GOFAI or interactionist AI. Nor does it single out a particular technical tradition as being peculiarly suited for artistic expression. For example, subjective avatars draw from interactionist AI, Office Plant #1 draws from statistical AI, and Terminal Time draws from GOFAI. Rather, expressive AI is a stance or viewpoint from which AI techniques can be rethought and transformed. New avenues for exploration are opened up; research values are changed.

Build microworlds with human significance

Building microworlds was an AI approach popular in the 1970s. The idea was to build simple, constrained, artificial worlds in which an AI system could exhibit its competence. The hope was that it would be possible to slowly scale up from systems that exhibit competence in a microworld to systems exhibiting competence in the real world. The microworld research agenda has been widely criticized;[10] it did not prove possible to scale systems up from microworlds. However, the microworld concept can be useful in expressive AI. An AI-based art piece may be a microworld with human significance. The "micro" nature of the world makes certain AI techniques tractable. As long as the microworld has some cultural interest, the system still functions as an artwork. This is simply the recognition that an artwork is not the "real world" but is rather a representational space crafted out of the world. The AI techniques used in an artwork only have to function within the specific artistic context defined by the piece. For example, in Subjective Avatars, the agents only have to operate within the specific dramatic context defined by the storyworld.

Actively reflect on affordances associated with different architectures.

Expressive AI practitioners must unpack the complex relationships that exist between authorial intention and different architectures. Architectures, and the associated technical practices supporting the architecture, make available different authorial and interpretive affordances. Active reflection on the co-evolution of affordances and technical solutions is part of expressive AI considered as a design practice. By understanding these relationships, the practitioner improves her skill as an AI-based artist, becoming more able to navigate the design space of affordance plus architecture. While this reflection is similar to AI research practices, it differs in focusing explicitly on affordances, which are commonly left unarticulated in traditional AI practice.

Cultural theory and expressive AI

In the first part of this paper, I took pains to undermine any claim interactionist AI might have for being peculiarly suited to artistic practice by diagnosing the link that exists between cultural theoretic critiques of Enlightenment rationality and interactionist AI. This may have left the reader with the impression that I am hostile to cultural theoretic studies of AI. This is not the case. Culture theory is extremely valuable for unpacking hidden assumptions lurking in AI practice. Understanding these assumptions allows an artist to gain a free relation to AI technology, to avoid being forced into the "natural" interpretation of the technology that has been historically constructed. It is only the implicit claim that a particular technology is suited for artistic expression that expressive AI rejects. Cultural studies of AI help a practitioner to maintain a free relation to technology, but this is a process, not an achievable end. There is no final, "perfect" AI to be found, for artistic or any other purpose.

Computer games as a high-art form.

AI-based interactive art has the potential to hybridize with computer games to form a new mass-audience high-art form.[16] Electronic media art is already stretching the boundaries of the gallery and museum space. Perhaps, like cinema before it, electronic media art will need a new venue in order to become broadly accessible. AI-based interactive art already bears some similarity to computer games. Interactive drama is related to the already established form of the adventure game, though it differs in its focus on the first-person experience of a dramatic arc rather than goal-based puzzle solving. Office Plant #1 shares a focus on long-term engagement with virtual pets such as Dogz and Catz,[23] though virtual pets are intended for circumscribed, high-intensity interaction while OP#1 provides continuous, ambient commentary. These similarities hint that AI-based art could be disseminated in a manner similar to computer games, inhabiting the new cultural niche of "high-culture" interactive experiences.

I sometimes call my own practice AI-based art and entertainment as a way to indicate my interest in blurring the art/entertainment distinction. This distinction is really found in the culture of production, not the culture of reception. Cultural producers find it important to distinguish themselves from the "low-culture trash mongers" (if they are artists) or from the "elitists who produce only for themselves" (if they are entertainers). In the culture of reception (cultural consumers) this distinction is not sharp; it is part of a continuum ranging from "brain-dead" entertainment to "edifying" entertainment. This fluidity in the culture of reception makes the hybridization of AI-based art and computer games viable.

Conclusion

Expressive AI is a new interdiscipline of AI-based cultural production combining art practice and AI research practice. Expressive AI changes the focus from an AI system as a thing in itself (presumably demonstrating some essential feature of intelligence) to the communication between author and audience. The technical practice of building the artifact becomes one of exploring which architectures and techniques best serve as an inscription device within which the authors can express their message. Expressive AI does not single out a particular technical tradition as being peculiarly suited to culture production. Rather, expressive AI is a stance or viewpoint from which all of AI can be rethought and transformed.

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The SF of Technoscience: The Politics of Simulation & A Challenge for New Media Art

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"In fact, science fiction...is no longer anywhere, and it is everywhere, in the circulation of models, here and now, in the very principle of the surrounding simulation."

Jean Baudrillard

"Biology is becoming an information science...and it will take increasingly powerful computers and software to gather, store, analyze, model and distribute that information."

Ben Rosen
Chairman, Compaq Computer Corporation

"The best way to predict the future is to invent it."

Richard Feynman

One of the significant characteristics of the last decade, and the new millennium, is the way in which advancements in biotechnology and medicine have come to the attention of the public, through the media, as one of the primary areas in which the future is being vigorously imagined. What distinguishes biotechnology from other sciences is the way in which it is increasingly fusing genetic code with computer code, encapsulated in what Incyte Pharmaceuticals calls "point-and-click biology."

Likewise, the development of the Web, along with parallel advancements in computer graphics and modeling, has made possible a unique domain within the arts that has been variously called "new media" and "net.art." Combining elements of programming, electronic writing, digital imaging and animation, virtual environments, and streaming performances, net.art is rapidly emerging as the cultural vanguard in technologically advanced cultures.

Linking these two trends (contemporary biotechnology and net.art) is thus an array of computer-based technologies of simulation and virtuality. In Jean Baudrillard's famous formulation, the simulacra is the "copy without an original;" that is, the logic of simulation proceeds through a paradoxical circuit in which "the real" is lost at the very moment that it can be perfectly simulated.[1] Both biotechnology and net.art highlight issues concerning the simulation of the real (for instance, in medical imaging and simulation, or in the construction of interactive virtual environments), though in very different ways. Both also are engaged with computer, networking, and simulation technologies which, at the same time, challenge traditional notions of embodiment, presence, and subjectivity.

This paper begins with an exceedingly difficult and complex question: If contemporary "technoscience" (in particular, biotechnology) is one of the most significant domains where issues pertaining to science, technology, and power relationships in society all intersect, what possible spaces are there for critically understanding, analyzing, and contributing to the discussions over the future of medicine, health, and normativity? In a domain where concepts of health, disease, identity, race, gender, and mortality all inform "hard" science research, such a question arises out of a concern for the ways in which a "biopolitics" is currently being formed through developments in the relationship between molecular genetics and computer technologies. The question which this paper asks, and which will remain an open question, is whether the emerging category of net.art can occupy this critical space.

The Biotech Century

Molecular biotechnology is at the forefront of developments in both science and technology, attracting both investment capital as well as government endorsement, the most recent example being President Clinton's inauguration of the new millennium by naming January as "National Biotechnology Month."[2] The President's statement was clear in its vision of a future biotechnology in which medicine is both curative and preventive, in large part due to advances in both molecular science and information technology. Such sentiments were also echoed, at the same time, by a special section presented by Biospace.com, the leading hub for the biotech industry. Entitled "Biotech 2030: Eight Visions of the Future," articles and interviews with leading researchers followed French Anderson's comments concerning gene therapy: "By the year 2030, I think that there will be gene-based medicine for essentially every disease... We will all know our individual genetic weaknesses by then via chip technology... It should be possible to receive a gene or gene-based medicine to alter how important genes are regulated, to prevent disease from occurring in the first place."[3]

What merits our attention here, is that after a stormy decade which saw Dolly the sheep, human embryonic cloning, debates over human stem cell research, the pressure put on the Human Genome Project by privatized genome mapping projects, the boom of the pharmaceutical industry (or "Big Pharma"), the patenting of cell lines from indigenous populations, gene therapy tragedies, and a plethora of new research technologies (including DNA chips, DNA fingerprinting, and DNA profiling), it is becoming clear that a certain type of futurological, forward thinking is a key component to the continued development of the biotech industry and its future applications in medicine and health care.

So then, we might pose our initial question in another way: In a domain in which the science-fictional future of biotechnology has always already arrived, what functions does or can science fiction (SF) have?

SF Mode

In order to approach such a question, it will be helpful for us to first attempt to outline something like a "definition" of contemporary SF. To be sure, histories of SF as a genre refer to as many definitions as there are movements or types of SF.[4] However, for our purposes here, we might begin with the following: SF names a contemporary mode, in which the techniques of extrapolation and speculation are utilized in a narrative form, to construct near-future, far-future, or fantastic worlds, in which science, technology, and society intersect.

This is of course a provisional definition, but in it are three important components that characterize contemporary SF (most often in literature, film, and video games). The first is the distinction between the methodologies of extrapolation and speculation.[5] Generally speaking, extrapolation is defined as an imaginative extension of a present condition, usually into a future world that is "just around the corner" or even indistinguishable from the present ("the future is now"). By contrast, speculation involves a certain imaginative leap, in which a world (either in the distant future or altogether unrelated) markedly different from the present is constructed. As can be imagined, most SF involves some combination of these, culminating in worlds that are at once strange and very familiar.

Secondly, SF's narratological goal is the delineating of a total space in which certain events occur; that is, the construction of entire worlds which operate according to their own distinct set of rules which form their own "reality" (what has been called the "ontological" mode in SF).[6] Finally, more and more genre SF is coming to terms not just with technical concerns, but also with social, cultural, and political concerns. As such, the use of extrapolation or speculation, and the construction of ontological worlds, move SF into a realm that involves thinking about the complex dynamics between technology and globalization, science, gender, race, and related concerns.

Such a complexification of SF has been highlighted by critics such as Fredric Jameson as a critical function. In an article entitled "Progress Versus Utopia" Jameson articulates two critical functions that SF can have.[7] The first is characterized by the development of "future histories," or ways in which SF places itself in relation to history. Discussing SF as the dialectical counterpart to the genre of the historical novel, Jameson suggests that one of the primary roles of SF is not to "keep the future alive" but to demonstrate the ways in which visions of the future are first and foremost a means of understanding a particular historical present.

A second role Jameson ascribes to SF is a more symptomatic one. Referencing the work of the Frankfurt School on the "utopian imagination," SF can form a kind of cultural indicator of a culture's ability or inability to imagine possible futures. For Jameson, writing during the high point of postmodernism, SF was an indicator of a pervasive loss of historicity and the atrophying of the will to critically imagine utopias. Thus, not only is each vision of the future conditioned by a historical moment in which it is imagined, but, increasingly, SF's main concern is with the contingency involved in producing the future, as well as interrogating the constraints and limitations which enable the capacity to imagine the future at all.

The Disappearance of SF

But what happens when the distance that separates the imaged future of SF from the empirical reality of a society is effaced through advanced technologies of simulation? In a text discussing "Simulacra and Science Fiction," Jean Baudrillard outlines a set of analogies between his theories of simulation and three different modes of SF.[8] Corresponding to Baudrillard's first stage (that of "counterfeit" or classical modes of representation) is the category of the utopia, the creation of a wholly different sphere whose primary intention is to stand in contrast to the real world (just as the counterfeit is qualitatively differentiated from the original). To the second stage of simulation (that of industrial "production") is genre SF, especially as characterized during the so-called "Golden Age Here SF operates according to its originary definition given by Hugo Gernsback in the 1930s: as "scientifiction," as the use of the knowledge of science and technology to produce technically plausible (and entertaining) visions of the future.[9] In the same way that industrialism also implied automation, genre SF during the early part of the century became heavily constrained by the limitations of genre writing for pulp magazines (a constraint SF was rarely to break out of until the New Wave).

Finally, corresponding to the third order of simulacra (that of simulation itself, in which the real becomes the hyper-real, and representations become copies-without-originals) is a zone which Baudrillard does not or cannot name: "The most likely answer is that the good old imaginary of science fiction is dead and that something else is in the process of emerging..." The crisis which Baudrillard is isolating here is the gradual effacement of the distance which had traditionally enabled SF to function as a mode of envisioning the future. Without the distance between imagined future and historical present, between virtual realities and real virtualities, between information and the thing-itself, SF begins to lose its own placement in our culture. If the technologies which define the "information society" are predicated on their ability to create virtual spaces and mediated experiences, which attempt to approximate "the real then the need for a separate space of imaginative future world-building begins to disappear; in other words, SF begins to disappear. As Baudrillard comments, "the models no longer constitute either transcendence or projection, they no longer constitute the imaginary in relation to the real, they are themselves an anticipation of the real, and thus leave no room for any sort of fictional anticipation..."[10]

In such a scenario, the imaginative capacity of fiction becomes irrelevant because it is already built into the technologies themselves. To keep with our theme of biotechnology, such a confusion of technology and SF is seen in areas such as genomics and telemedicine, where "the model" is the genetic code of an individual subject, and the SF extrapolation is contained in the technical capacity for "disease profiling" (where susceptibility to genetic disease is read from an individual's genetic code), and a future telesurgery (where surgeons focus on a computer simulation and not the patient they are operating on).

If we take Baudrillard's basic claim here (that, in the contemporary scene of hyper-media and virtuality, SF is always already surpassed by technological advancement) we can begin to locate anew the space left empty by Baudrillard in the third order of simulacra. Put simply, the question is, if SF can no longer play its traditional role of imagining the future (because technological advance has already virtualized the future for us), what happens to SF in the scene of simulation?

The SF of Technoscience

As a third-order simulacra, SF is not necessarily different from the technologies and the sciences it narrativises, and in fact creates the conditions for their possibility. In fact, SF is necessary in order for biotech and biomedicine to continue constructing their narrative of technological advancement and the increasing sophistication of the biotechnologies of the population.

In other words, the functions and attributes of genre SF (which still exist in genre SF, but which can now only belatedly keep up with developments in science and technology) have been appropriated by the technosciences. As a powerful political tool, SF enables the biotech industry to create a narrative of a bioinformatically based, disease-free, corporate-managed future. In doing so, it is also creating a history, a self-fulfilling narrative of progress.

What is unique about the manifestation of SF at the opening of the biotech century is that SF is no longer the proper domain of culture (that is, of culture's critically commenting upon the intersection of society, science, and technology). Instead, SF has come to be self-consciously embodied as part and parcel of the domains of biotech and biomedicine. To take two examples: researchers at the NASA Ames Center for Virtual Surgery explicitly utilize the rhetoric of SF in a language infused with the giddiness of new technologies. They clearly envision a future of telemedicine which would be at home in the Cyberpunk worlds of Gibson, Sterling, or Cadigan.[11] Their experiment last spring of a three-way, fully simulated, telesurgical collaboration is a concrete manifestation of what the discourse of SF can make possible. Similarly, in a recent article in "Scientific American," researchers reporting on advances in tissue engineering make references to the foundational visions of SF as the model for tissue engineering's ability to grow tissues and organs in the lab:

Promoting tissue and organ development via growth factors is obviously a considerable step forward. But it pales in comparison to the ultimate goal of the tissue engineer: the creation from scratch of whole neo-organs. Science fiction's conception of pre-fabricated "spare parts" is slowly taking shape in the efforts to transplant cells directly to the body that will then develop into the proper bodily component.[12]

This is, to be sure, a trend which has been with the science-technology complex for a long time. But instead of functioning as an external promotional tool (that is, as a discursive means of justification), SF now internally conditions and structures biotech research, finding itself in the midst of governmental regulations over the possibility of human cloning, in the new lines of automated software-driven DNA sequencing machines, or in the generation of financial investment for the promises of biotech startups.

Given this formulation, we can currently see SF operating in three main ways with regards to the biotech industry:

First, SF operates as a meta-level discourse for the promotion, justification, potential application, and development of products and services for the biotech industry. This can be readily seen through press releases, strategic corporate mergers, and advertising in specialist and non-specialist media.

Secondly, SF operates in a more constitutive and foundational manner within biotech, actually conditioning the range of what it is possible to do and what kinds of questions it is possible to ask. This is a discourse informed by economic imperative and the traditions of "discovery science," but its mode of operating is that of using extrapolation and speculation to ask research-based questions of the present. The developments of the DNA chip, neurosoftware implants, and tissue engineering are examples of this "precession" of SF.

The biotech lab of the future: automated sequencing computers and high-throughput analysis.

Finally, the ways in which SF is manifested in biotech reveals radical changes which ultimately pose difficult philosophical and bio-ethical questions concerning how "health" and "normativity" will be defined in the future. Already, with the prevalence of genetic science, the notion of the genetic code as both preceding and forming an essential core of the subject is becoming a widespread notion. The distance that separates the introduction of new ways of thinking ("I am my genetic code") with their naturalization (through discourses and concrete practices) is the space of SF.

The SF of Net.Art

This is, certainly, not the most optimistic alliance between computer technology and bio-technology, and it is a complicated field which contains as many promises as it does problems. However, looking at biotech and the ways it incorporates technologies of simulation through the lens of SF reveals some important tendencies.

Clearly, the "SF" in technoscience is not the same "SF" that we are accustomed to in literature and film. The SF in technoscience does strategically utilize extrapolation and speculation. It does create visions of future worlds in which advanced science and medicine have new relations to disease and the body, and in doing so it does make a comment on the ways in which future biotech is largely dependent upon technology development to achieve this future vision. Yet the characteristic which Jameson pointed to earlier, and which was in danger of disappearing in the postmodern (that is, the critical function) is markedly absent from the SF futures imaged by the biotech industry.

One way of discussing this is to mark the difference between SF in technoscience and SF as a cultural and critical activity. Incorporated into technoscience (particularly biotech), SF plays the role of "actualization the role of discursive negotiator, with the main goal being the emphasis on scientific advance and technological progress as the keys to a realization of the future. In this mode, SF's only purpose is to ensure the realization of the future imaged by the biotech industry; SF as a domain of possibility is thus displaced by SF as a pressing concern for making the future a reality.

By contrast, the SF which critics such as Jameson, Donna Haraway, and others discuss is both critical and multi-perspectival. In other words, the critical mode of SF is not about "actualization" but about "potentiality." Here potentiality serves to signify futures that may exist, as well as futures that will not exist (or that should not exist, the critical function of the dystopia). SF as potentiality thus means a certain mobility or autonomy to the category of the potential (as what reserves the right not to exist as well as to exist). Regarded as potentiality, as the work of imagining critical futures, SF is not locked into the narrow path of simply realizing the future or actualizing it. In this sense SF can serve a critical function, and it can do this by creating mobile zones whose primary intention is to comment upon, and intervene in, the "history of the present."

However, this distinction between SF as actualization (SF as it is manifested in technoscience) and SF as potentiality (SF as a critical mode) should not simply mean a return to the kind of literary, dystopian SF works which served an earlier historical moment. In the same way that SF has been embodied in the very techniques and technologies of the biotech industry (especially in its use of computer simulation and the Web), SF can also work from within these technologies to create points of slippage, fissures in the production of homogenous futures. Continuing developments in the areas of computer animation, 3D modeling and the construction of virtual environments, tele-robotics and motion-capture, and an array of technologies for presenting and broadcasting or Web casting innovative work are all becoming available not only to scientists but also to artists, performers, and cultural activists.

The challenge put forth to new media art and net.art is thus to take up this critical function of SF and re-insert it back into the discourse of contemporary technoscience. This has already been happening in the intersections of art and technology for some time, and it is taking new forms with net.art and digital culture, with groups such as Critical Art Ensemble, Mongrel, Fakeshop, and Biotech Hobbyist. Whereas literary SF was limited to describing technologies in extrapolative, near-future scenarios, new media and net.art contain the capacity to actually embody and utilize these "future technologies" in radically new ways. In an important way, then, such projects are SF in as much as they utilize the strategies of SF to ask important questions concerning the future of the human-machine relationship.

Notes

1. Baudrillard J. (1983). *Simulations*. New York: Semiotext(e).
2. O'Brien, S. (2000, January 20). Biotech industry gets Clinton's endorsement. *CBS Marketwatch* (cbs.marketwatch.com). The president's statement can be found at the White House Web site: www.pub.whitehouse.gov.
3. Biospace.com. (2000, January 6). *Biotech 2030: Eight visions of the future*. www.biospace.com.
4. Recent histories of SF include Brian Aldiss's *Trillion Year Spree: A History of Science Fiction* and Edward James's *Science Fiction in the Twentieth Century*. A good reference work is Clute, J. &Nicholls, P. (eds.). (1995) *The Encyclopedia of Science Fiction*. New York: St. Martin's.
5. In his book *Constructing Postmodernism* (New York: Routledge, 1992), Brian McHale discusses the differences between extrapolation and speculation: "Extrapolative SF begins with the current state of the empirical world ... and proceeds ... to construct a world which might be a future extension or consequence of the current state of affairs." (p. 244) "Speculative world-building, by contrast, involves an imaginative leap, positing one or more disjunctions with the empirical world which cannot be linearly extrapolated from the current state of affairs." (p. 244).
6. Ibid., p. 247.
7. Jameson, F. (1982). Progress versus utopia; or, can we imagine the future? *Science Fiction Studies 27*, 147-58.
8. Baudrillard, J. (1997). Simulacra and science fiction. In *Simulacra and Simulation*. Ann Arbor: University of Michigan Press.
9. Hugo Gernsback (1884-1967) is often referred to as the father of genre SF. In the late 1920s, he began publishing a magazine called *Amazing Stories*, which published a number of well-known SF authors of the "Golden Age" of SF. In addition, he formulated a term for a new type of fiction emerging at the turn of the century (as exemplified by Verne and Wells): "scientifiction," in which adventure and romance plots were combined with elements from science and technology (primarily physics, astronomy, engineering).
10. Baudrillard, op.cit., 122.
11. More information on the NASA Ames Virtual Collaborative Clinic can be found at: biocomp.arc.nasa.gov/teleMed/vcc.html.
12. Mooney D. & Mikos, A. (1993, November). Growing new organs. *Scientific American*, 12.

(art)^n Laboratory

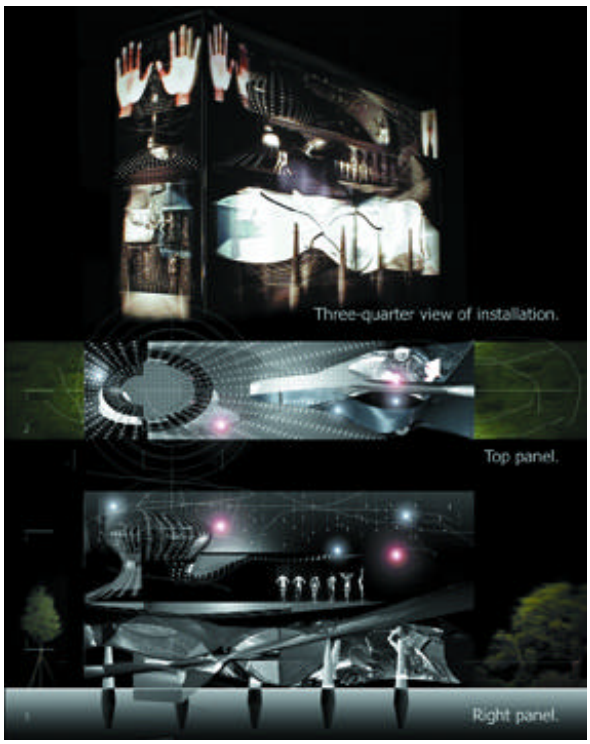
(art)^n Laboratory, a collaborative art group and media lab that has been based in Chicago since its inception in 1983, is comprised of its director and founder, artist Ellen Sandor, and a dedicated core group of visual and computer artists. The laboratory possesses a vital and extensive portfolio thanks to the talent and sophistication of its members and the accomplished artists, scientists, and mathematicians with whom it has collaborated. These collaborations have spawned a body of artwork that is invaluable both for its pioneering aesthetic and the historical importance of the scientific concerns and discoveries first portrayed by (art)^n and research teams working together.

The (art)^n work presented at SIGGRAPH 2000 is entitled Townhouse Revisited, 1999. This PHSCologram and interactive audio sculpture addresses issues of the body, public space, and touch in the architecture of virtual reality. The work was created in response to such questions as: If hard matter and gravity offer no impediment in virtual reality, what then will meeting, working, and playing spaces look like there? How might form, substance, and light evolve as we navigate through virtual structures? Would the body's passage behind a monitor's glass raise any layered echoes of sound? How would sound behave in a virtual space with no true surfaces to bounce off of — only image planes? Would sound bouncing off image planes be affected spatially by the digital code that makes up the structure of the image?

The (art)^n Laboratory is unusual among artist's groups in that it holds landmark patents in 20th century visual technology. In 1989, after six years of research and development, the group patented what is called the PHSCologram (pronounced skol-o-gram), the very first virtual photographic hard copy process. "PHSCologram" is a word coined by the group in 1983. It contains the acronym PHSC for photography, holography, sculpture, and computer imaging. In practice, it includes a process of digitally combining color images with computer-generated models and outputting these composites as 3D image hardcopies.

In inventing and patenting the first 3D digital output technology, the (art)^n group has been able to push the conceptual and aesthetic boundaries of its own unique medium. The PHSCologram is arresting in its unconventionality. In an exhibition space, the back-lit and fully dimensional images extend from darkly framed image planes toward the viewer. The images are lush, detailed, and visceral in effect.

(art)^n Laboratory also invented the Igram, which has become known as "the hard copy of virtual reality." The Igram is a snapshot or still (similar to a film still) taken in virtual reality environments. But more than that, it involves a sophisticated set of software and hardware developed by both (art)^n Laboratory and the Electronic Visualization Laboratory at the University of Illinois at Chicago.



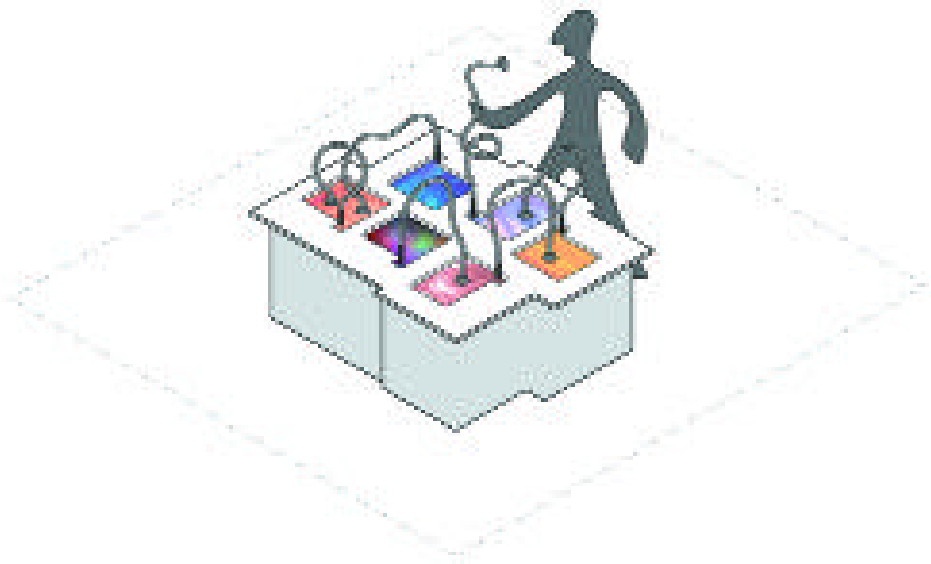
Townhouse Revisited
Vintage PHSCologram sculpture
25 inches x 40 inches x 10 inches

Thomas J. McLeish
Ellen Sandor
Fernando Orellana
Nichole Maury
Todd Margolis
Janine Fron
artn@artn.com

The Introspection Machine is an interactive environment for visual feedback. The machine consists of six modules, each of which has a flexible, manipulable "eyestalk." At the end of each eyestalk is a large rubber suction cup, which permits it to adhere to any of the six displays in the installation. The machine's modules transform the video input from their manipulable eyestalks into supple and organic dynamic displays. By redirecting these eyestalks, users can explore an unbounded space of continuous light, complex forms, and surprising relationships.

The machine's reconfigurable eyestalks comprise the principal interface by which participants interact with the installation. These playful stalks, which pipe pure light and information from computer to computer, make it possible for the video output from one reactive display to be used as the input for another. An Introspection Machine module may even be piped back to itself, creating a tight loop of visual recursion. As visual material from each display is reinterpreted by the others, pools of light shift and mutate based on the connection, configuration and movement of the stalks'suction cups.

As a display system for fluid colors and forms, the Introspection Machine can be thought of as an interactive light fountain, in which participants liberate the "water" welled into each monitor by physical conduits of video information. As a complex feedback system, on the other hand, the Introspection Machine has analogies to a wholly visual brain, whose cybernetic intelligence is derived from the principle of feedback itself.



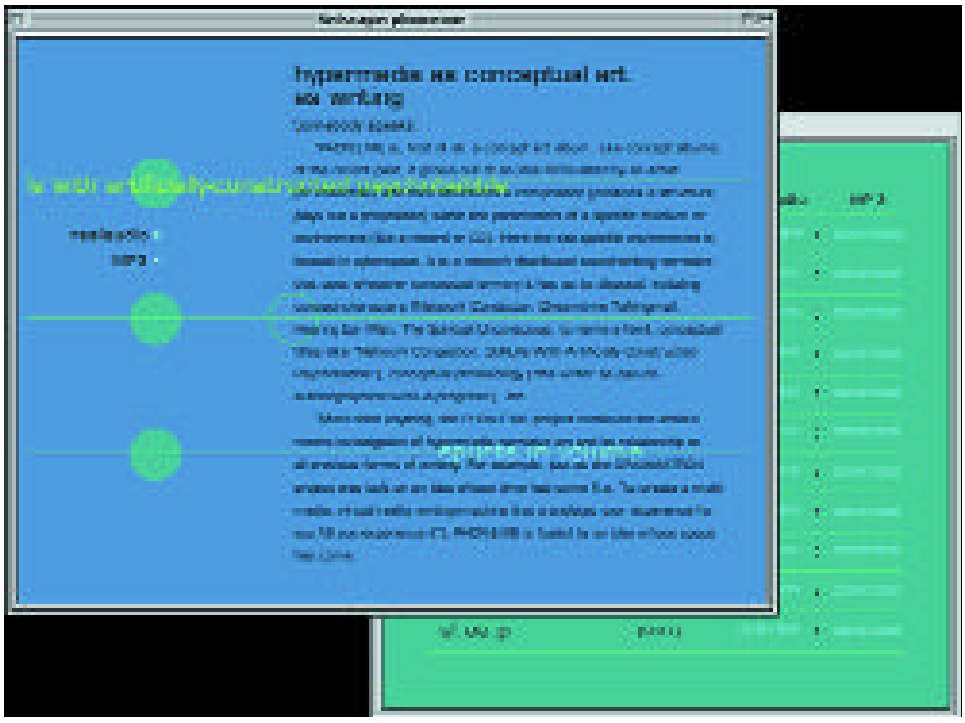
The Introspection Machine

Interactive installation

Elise Co
Ben Fry
Alex Killian
Golan Levin
Casey Reas
Jared Schiffman
Tom White
John Maeda
Aesthetics and Computation Group
MITMedia Laboratory
introspect@media.mit.edu

Mark Amerika

Using the m.o. “surf, sample, manipulate,” PHON:E:ME remixes sounds and texts to create an original composition that blurs the borders among spoken, written, and sculpted artistic forms. It is part oral narrative, part experimental sound collage, and part written hypertext.



PHON:E:ME
phoneme.walkerart.org

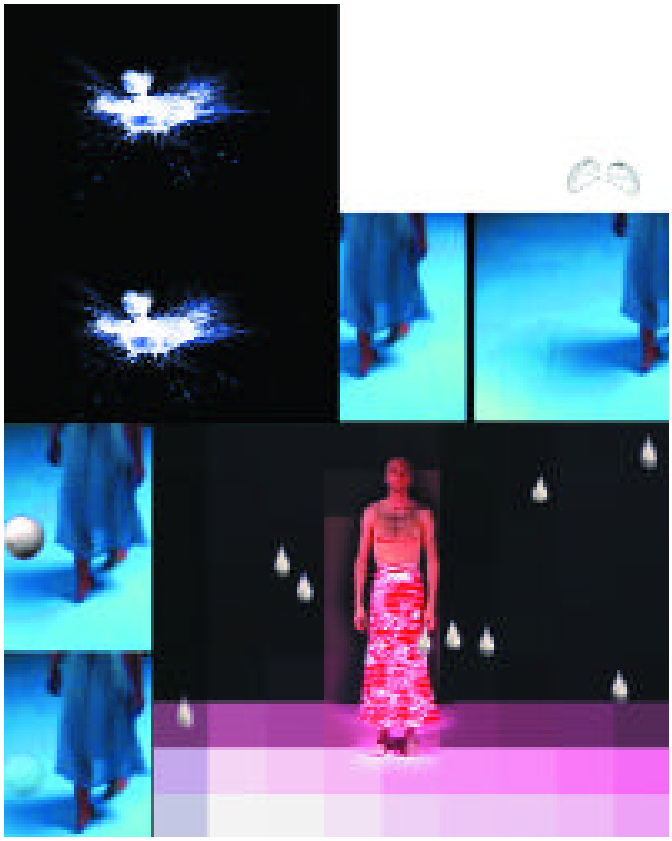
Mark Amerika
Alt-X Digital Arts Foundation
amerika@netspace.org

Interface Design
Anne Burdick

Sound Design
Erik Belgum

Programming Design
Cam Merton
Tom Bland

The installation consists of two sculptural objects in space, stereographic video projected on these objects, interactive jackets, and audio. The topic of the piece deals with hysteria and boredom.



HAME
Interactive installation
4 meters x 7 meters x 6 meters

Concepts, visuals
Laura Beloff
ARS Electronica Center/Futurelab
Pepinieres Artist-in-Residence Program
laura@fl.aec.at

Sounds, audio design
Markus Decker
AES Electronic Center/Futurelab
Pepinieres Artist-in-Residence Program

Kathleen Brandt

Exclusion Zone is an interactive installation that explores the concept of toxic subjectivity. Three lab tables with microscopes reside on a map representing radioactive fallout from the 1986 Chernobyl nuclear plant explosion.

The map is printed on a 17-foot x 12-foot laminated rubber floor surface. Each table contains a tray of glass, specimen slides containing miniature narratives about the artist's thyroid cancer, and radiation treatments to be read through the microscopes.

Exclusion Zone
Interactive installation
17 feet x 12 feet

Kathleen Brandt
Brandway
brandk@rpi.edu

Richard Brown

A visceral and immersive 3D experience of evolving, responsive, and abstract artificial life forms. Gestural sensing (via the MITfish) enables viewers to fly in the Biotica world by simply using their arms. Biotica questions our ability to perceive aliveness and sentience through dynamic behaviour rather than simply visual appearance.

Biotica
Rear screen 3D projection

Richard Brown
Royal College of Art
r.brown@rca.ac.uk

Lois Burkett

Moment (#1) explores a violent moment and its aftermath. This work depicts the physical event, its shock, dislocation, and sense of entrapment.

Moment (#1)
Iris print from Photoshop file
16.5 inches x 20.5 inches x 1.5 inches

Lois Burkett
loisjaneburkett@netscape.net

John Chakeres

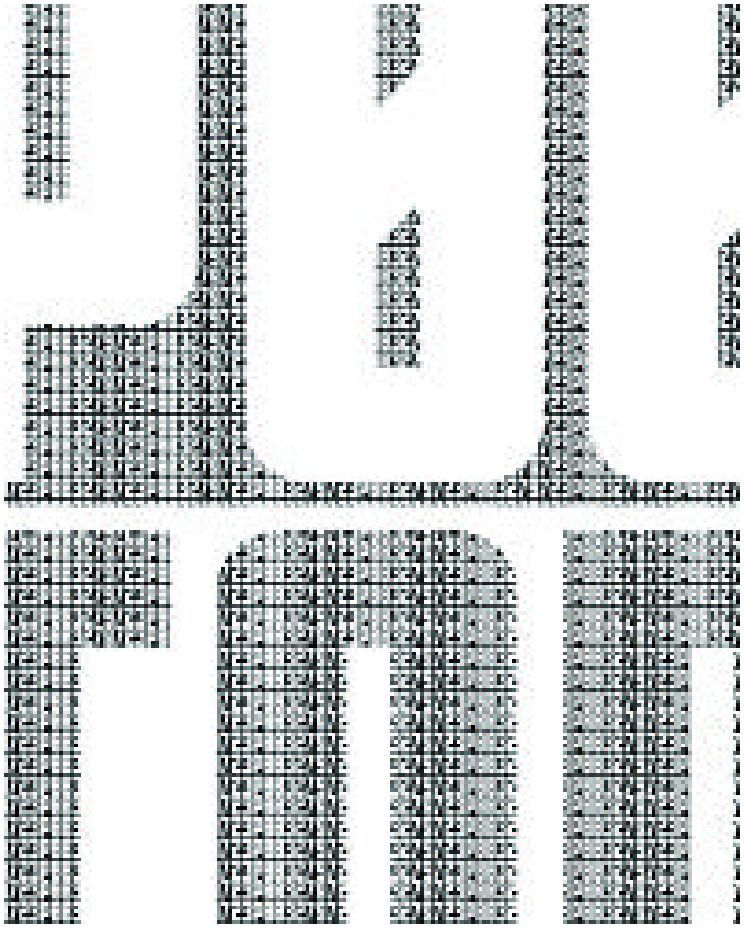
I've always treated the content of my photographs and digital images as found objects. Photographic film's ability to record objects with high definition and fidelity has always attracted me. With the camera, I come across a natural scene and record it with great clarity. It is, in essence, a found object or objects, if you will. With digital imaging, I have the ability to bring into the computer pieces of old artworks (history) and collected objects (touchstones), which I can then layer and collage to create new works of art with the same clarity and fidelity as my photographs. One could say it gives me the ability to appropriate or sample myself.

25 Palmer
Iris print
24 inches x 36 inches

John Chakeres
chakeres@concentric.net

Todd Childers

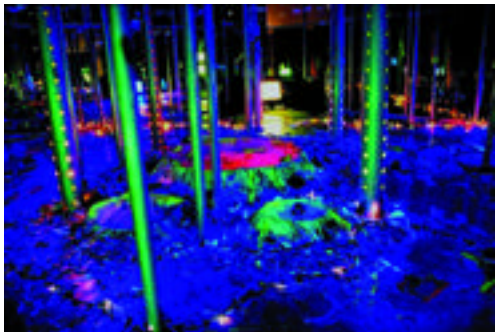
This is an artbook about my treatment and struggles with neurosarcoidosis. The book's secondary theme concerns becoming a number in a hospital bureaucracy and maintaining government support for medical bills. It uses MRI images to acknowledge the positive use of computers.

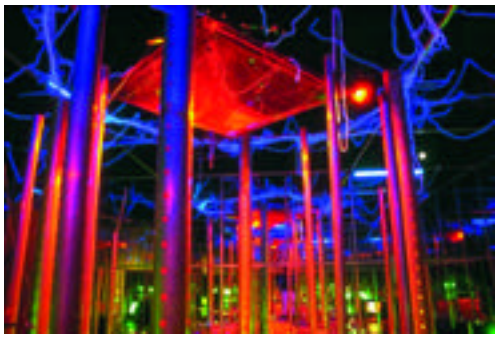


POO3279723
(Neurosarcoidosis is Todd Childers)
Bound art book

Todd Childers
Bowling Green State University
btoddch@bgnet.bgsu.edu

The original concept for this work came from photomontage experiments that expanded into 3D work composed with architectural structure, electronic lighting control, and sound effects, all of which depict a living space connected with time.





Utopia1997
Interactive installation

Sarawut Chutiwongpeti
Chulalongkorn University
utopia1998@hotmail.com

Stewart Dickson

A Zoetrope is constructed by attaching 60 phases of an object in metamorphosis to a rotating wheel. The “animation” is “frozen” in space via synchronized stroboscopic lighting. The metamorphosis is a torus turning “inside-out” at three points on its surface.

Costa’s genus 1 three-ended minimal surface is topologically equivalent to a simple torus.

Thanks to collaborators at the PRISM Center, Arizona State University

3-D Zoetrope
Kinetic sculpture
48 inches x 24 inches x 36 inches

Stewart Dickson
Stewart.Dickson@disney.com

Software
The Mathematica system for doing mathematics by computer (Wolfram Research, Inc.)
Custom software by Stewart Dickson

Hardware
SGI, Stratasys Genisys Fused Deposition Modeling (FDM) Machine

Elliott Peter Earls

"Excerpts from EYE SLING SHOT LIONS" is an interactive digital composition conceived and constructed around the Quicktime Media Layer, Max2, and Supercard technologies. During live performance, a melange of typography, sound, video fragments, interactive digital video, simulated live performance, short films, and pop music is controlled via MIDI and and interwoven with live poetry, sub-urban hip-hop, and spoken-word texts. Custom built interface elements link Elliott to computer-controlled video and typography, through extensive use of piezoelectric elements. Utilizing CD-ROM and LCD projection, "Excerpts from EYE SLING SHOT LIONS" is programmed to be modal. Not only is it a performance, it's a product ... a shiny disc full of ones and zeros ready to be taken home the night of the performance and put into your Walkman2 or your Mac. "EYE SLING SHOT LIONS" is the follow up to Elliott's critically acclaimed CD Plus "Throwing apples at the Sun."

EYE SLING SHOT LIONS
Live Performance

Elliott Peter Earls
The Apollo Program
elliott@theapolloprogram.com

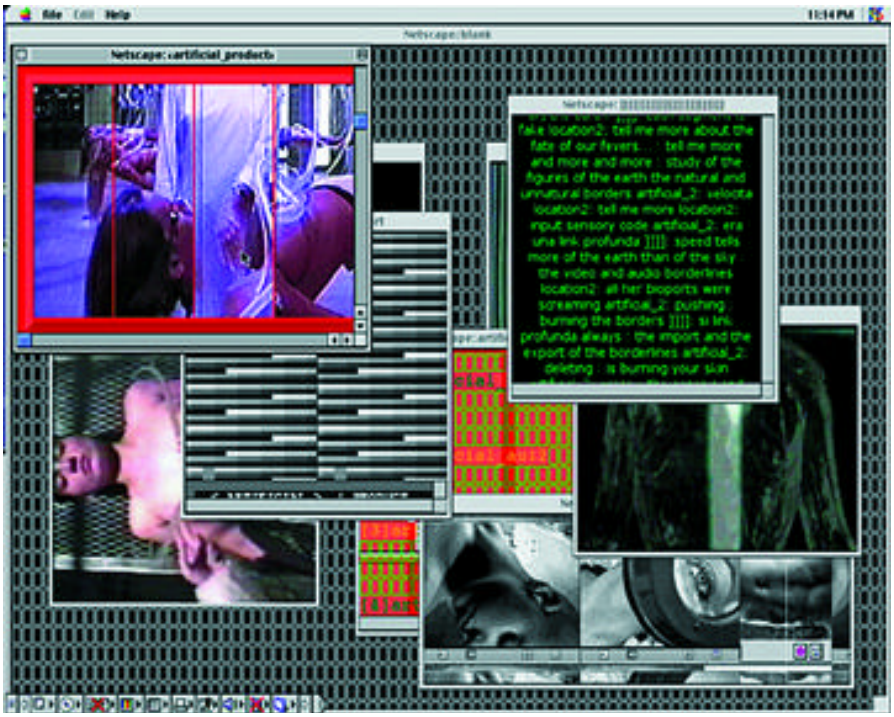
Fakeshop

This work is the result of a fascination with aesthetic by-products of computer procedure. It is a visuavisuaisuaegies of electronic audio/visual transfer (CuseeMe video-conferencing, Real Audio broadcasting, and other assorted hi/lo tech tools). We've endeavored to build an electronic theatrical device, to create conditions in which simultaneous transfer of digital information can occur in real time (transfer of experiential data being collected at a site of production to remote receiving and/or reciprocally re-transmitting audience-participation, collaborational links).

The live action continually repeats the attempt to reveal the relationship between public and personal-memory. Details extracted from the media sphere are investigated, dissected, redigested, in a series of multi-media tableau vivants. In the Web site, there is a remote point of entry into these various setups, hookups, site-specific installations, etc. It exists as a window into these actions and as evidence of these ephemeral procedures.

Recent performances and exhibits include: Whitney Biennial 2000 (Internet category), Ars Electronica '99, Next 5 Minutes 3 Conference, Hell.com, WKCR Electronic Music Festival, and Rhizome Artbase.

www.fakeshop.com



LifeScience - Fakeshop
Internet art experiments

Eugene Thacker
Rutgers University
maldoror@eden.rutgers.edu

Fakeshop Core Members
Jeff Gompertz
Prema Murthy
Eugene Thacker

Viewers of this interactive CD-ROM are invited to enter what seems to be a typical hotel room. As they navigate through the room, they encounter several objects, some personal (private) and others impersonal (public). When they are touched, many of the personal artifacts (a suitcase, a book, a day-timer), reveal stories, memories, conversations, or images. With each experience, viewers become more involved in and acquainted with how the two roommates are negotiating private and public space within the hotel room — a space that is inherently public, yet when inhabited takes on a private dimension. The hotel room functions as a metaphor for engaging questions about privacy, communication, boundaries, trust.

INSIDEOUT

Nan Goggin
Mick Brin
Joseph Squier
Robb Springfield
University of Illinois at Urbana-Champaign
n-goggin@uiuc.edu

Hunter Grant

This animation deals with oppression, torture, and hope. It is based on the Tibet-China relationship over the last 50 years, and it focuses on extreme violations of basic human rights. The story is told through the eyes of a prisoner who recalls the events of life in captivity.

LIBERATION
Animation

Hunter Grant
hunter_grant@hotmail.com

Bill Hill

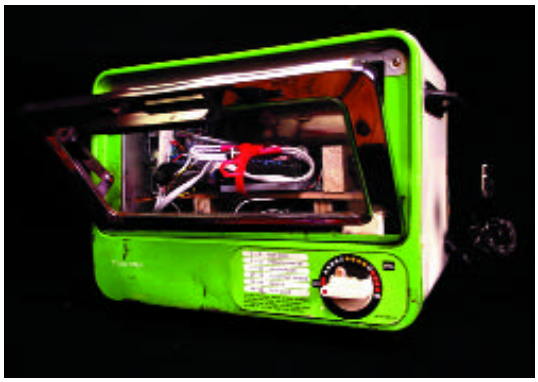
The Black Lung is a piece from the Techno-Darwinism series on the effect electronic technology is having on the human body's evolutionary process and how the theory of artificial selection is fostering increased genetic reliance on the machine.

The Black Lung
2D/3D wall-mounted kinetic sculpture
4 feet x 3 feet x 1 foot

Bill Hill
Jacksonville University
billhill@flashmail.com

Rania Ho

Free Range Appliances in a Light Dill Sauce is an exploration of anthropomorphic qualities inherent in household gadgets and an irreverent look at the meaning of "smart" appliances. Kitchen appliances are liberated from their mundane existences and taught motor skills so they can fully realize their suppressed ambulatory desires.



Free Range Appliances in a Light Dill Sauce

Interactive installation

Each appliance: 1 foot x 1.5 feet x 1 foot

Rania Ho
Interactive Telecommunications Program
New York University
r.ho.1@alumni.nyu.edu

Tiffany Holmes

Nosce Te Ipsum is Latin for “know thyself.”

When you enter the darkened installation space, you view a projection on a large scrim suspended from the ceiling. The image consists of a simple contour drawing of an androgynous human figure.

As you move closer to the image, you see a line of words across a floor dotted with circular targets. As you walk forward, following the words, you trip a pressure sensor that triggers a change in the animation. Suddenly, layers pull back and reveal that beneath the drawn body lies an interior composed of flesh, letters, words, and marks. Stepping on each target triggers another sensor and a continued shift in the animation as the body folds back on itself, revealing layers of images that give way to further images. When you step on the final sensor, your face, captured in real time with a video camera, appears beneath the embedded layers.

Nosce Te Ipsum invites you to examine a representation of yourself as constructed by the artist. Ho wever, in order to reveal the final image, you must participate in the dissective process in a cooperative manner. Your steps, timed as you choose, alter the projected body, penetrating the palimpsests of imagery that pull back, one after another, to reveal your face within the larger work. Stepping away from the projection reverses the process, causing the layers to rapidly fuse and hide your face in layers of imagery.

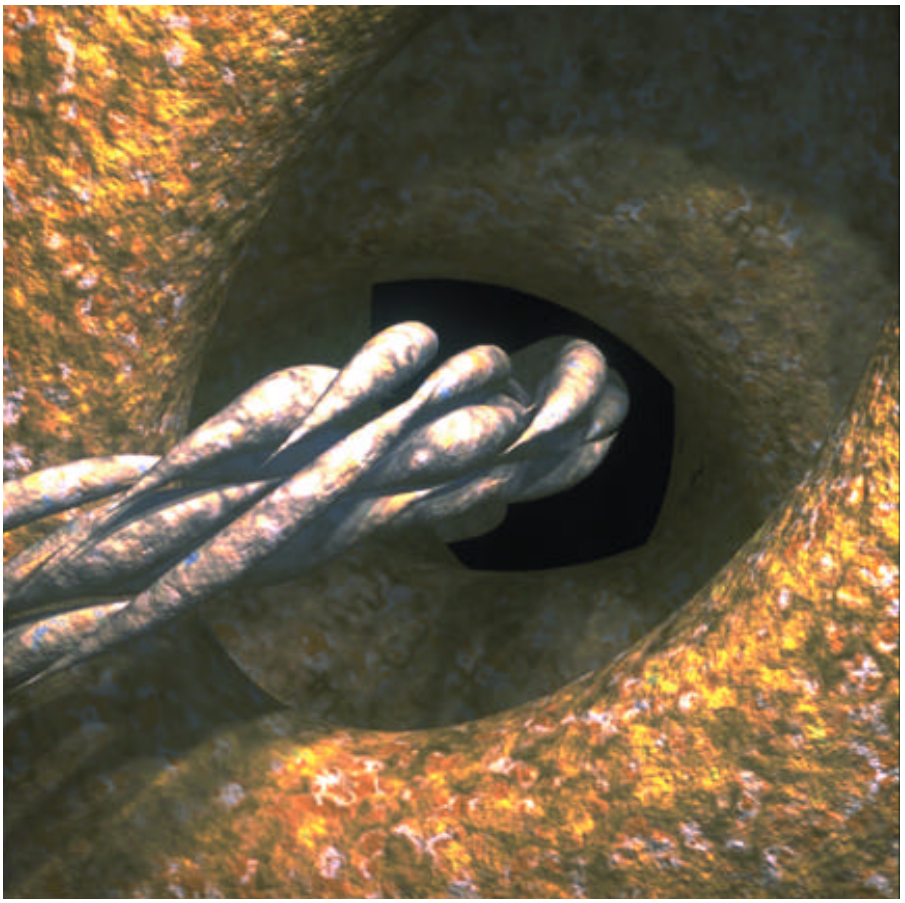
The layers of information that compose the digital apparition have many sources. Some have been hand rendered, others appropriated from a variety of sources (medical textbooks, popular magazines, old dictionaries). The layers are dynamic. They change as different people interact with the virtual subject.

The multiple skins of visual information that comprise the interior of the projected body raise questions about the boundaries of bodies and their significance. As the viewer interacts with Nosce Te Ipsum, layers of virtual skin are peeled back, drawing attention to the ways in which bodies both reveal and conceal, providing distinct modes of knowledge through interaction.

Nosce Te Ipsum
Interactive installation

Tiffany Holmes
University of Michigan
tgholmes@umich.edu

The penetration of the framing background objects by the stream of white forms and the subtle twisting of those forms adds to the sense of movement in this piece.

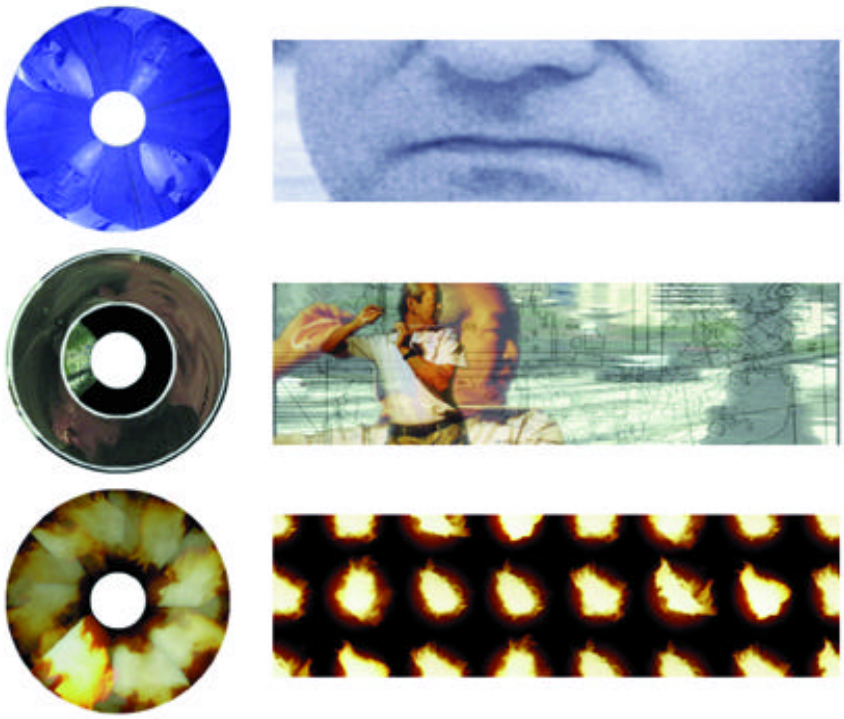


99.8A
Laser-exposed color photographic print paper
(Cymbolic Sciences LightJet)
30 inches x 30 inches

Kenneth A. Huff
ken@itgoesboing.com

Still images on three outer screens are choreographed to the sound and video of a central cylindrical screen. Coupling video art (a continually emerging, experimental discipline) with sculpture (dynamic yet historically more traditional), the installation becomes the ideal venue for exploring the relationships between art and technology, form and content.

www.electricbaby.com



REMEMBER WHEN WE THOUGHT TELEVISION WAS FLAT AND THE CENTER OF THE UNIVERSE?
Interactive installation

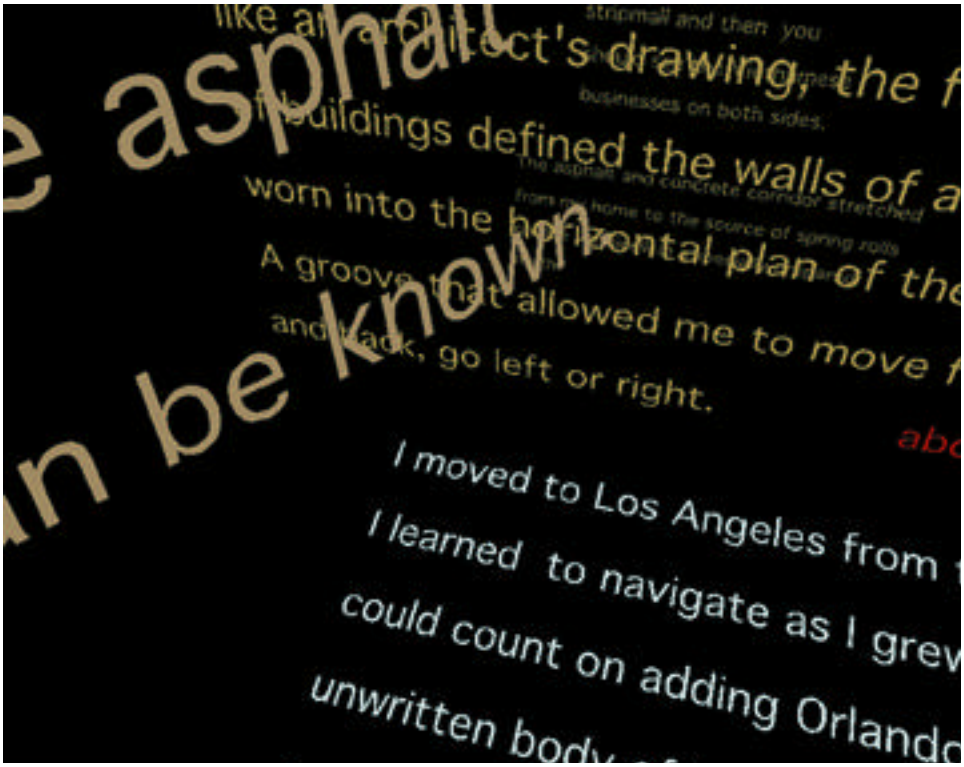
Franklin Joyce
Gerard Tsutakawa
franklin@electricbaby.com

Jeff Knowlton

"a text for the navigational age," a 3D textual environment, is a reflection of my displacement in both physical and virtual space, and an attempt to expand the activity of reading and writing beyond the two dimensional.

I grew up in Orlando, Florida, home to four generations of my family. There, I navigated the city through its building facades, lamp posts, billboards, and mailboxes. When I moved to the West Coast in 1993, I had to comprehend the layout of Los Angeles in its totality. Not knowing the landmarks, I turned to the map. Here I was confronted with a different conceptualization of space: the view from above.

"a text for the navigational age" is about reconciling these two ways of understanding space at a time when the Internet has thrust the rapid dematerialization of space upon us. The reader/flaneur is invited to interact by moving within a textual body that is always present in one, two, and three dimensions.



A TEXT FOR THE NAVIGATIONAL AGE
Web-based 3D textual environment

Jeff Knowlton
knowlton@calarts.edu

Mark Korn

With each piece that I create, I go through a healing process and grow further in health and happiness. With greater happiness, I have greater passion, and with greater passion that fire inside of me glows brighter.

A Flinching Mind
Digital printout
21 inches x 26 inches x 3 inches

Mark Korn
akorn@theplanet.org

Kumiko Kushiyama, Sinji Sasada

Hide-and-Seek is a future interactive dining table. Viewers walk around a dining table carrying a portable television. On one channel, they find find hidden images that mix real and virtual spaces.

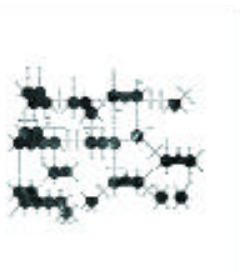
Hide-and-Seek
Interactive installation

Kumiko Kushiyama
Waseda University
kushi@ea.mbn.or.jp

Sinji Sasada
Japan Electronics College

Liz Lee

Within the contradiction between objective reality and abstract thinking, between the word and the thing, how do we identify ourselves? We have constructed about ourselves (and within ourselves) an environment of symbols and cannot tell where the symbols leave off and nonhuman reality begins.



Identification – Analyze

Ink-jet prints
36 inches x 76 inches

Liz Lee
State University of New York,
College at Fredonia
lizlee_ny@yahoo.com
elizabeth.lee@fredonia.edu

This Web work utilizes text, animated gifs, and MIDI tracks to explore the stereotypes and clichés associated with the word and symbol "heart." A lounge-lizard MIDI snare track and pumping, animated hearts introduce each text section, where a play on what a reader might expect to see when told to "Take Heart" or following statements such as "Heart Felt" and "Heart Ache" introduces wording quite other than "Hallmark."

This piece first appeared online at the Web journal frAme4, hosted by the trAce online writing community.

www.heelstone.com/heart/

Daddy Liked His with Heart
Web-based hypermedia

Jennifer Ley
Riding the Meridian
jley@heelstone.com

The words and the imagery can be used to describe sleep, dreams, and even death. The eye is said to lead to your soul. As the eyes grow dark, we leave this conscious world and journey into a more spiritual one.

The Eyes Grow Dark
Iris Print
18 inches x 17 inches

Jessica Maloney
Bowling Green State University
Jessica3@visto.com

Jacquelyn Martino

The images of hangman: is there an "I"? examine how our relationships with our bodies can influence self-identity. In these images, a metaphorical hangman emerges from the dark confusion left by the warring factions of inner and outer self: mental image and physical reality. The inner voice develops into a cacophonous, raging, judgmental monologue. The hangman takes host in the now harassed, disoriented self and embarks on an externally quiet yet destructive rage.

In an echo of the hangman word game, the hangman records individual body parts. As the inner self quests to solve the puzzle, the absence of "I" brings the game closer to a losing finale. The physical body, at times seemingly hidden by choice while at others completely obscured by environmental trappings, serves as testimony to the hellish battle.

Like an executioner, the hangman's charge is to carry out the sentence and ensure that the physical body falls from an appropriate height. In essence, the body destroys itself. Robbed of breath and ultimately strangled, the inner self has been supplanted by an overwhelming physical force.

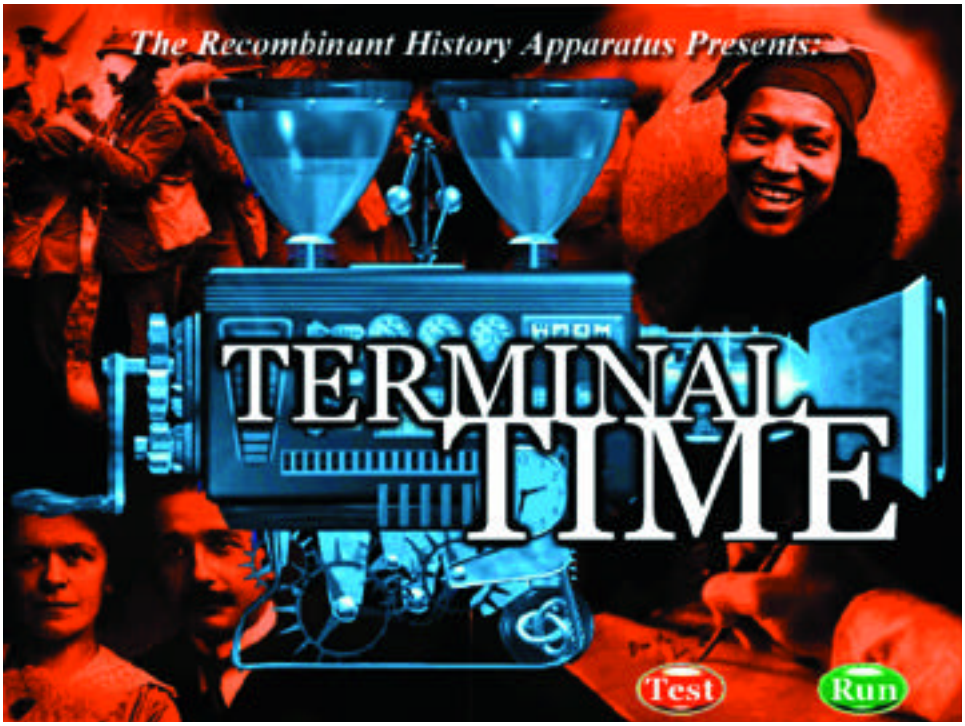
HANGMAN: IS THERE AN "I"?
Work on paper
24 inches x 28 inches

Jacquelyn Martino
jam67@columbia.edu

"Terminal Time" is a cutting-edge, audience-powered history engine that combines mass participation, real-time documentary graphics, and artificial intelligence to deliver the history that viewers deserve.

Each half-hour cinematic experience covers 1,000 years of history and is custom-made to reflect audience values and desires.

More information available at www.terminaltime.com.



Terminal Time
Interactive cinema

Michael Mateas
Carnegie Mellon University
michaelm@cs.cmu.edu

Steffi Domike
Chatham University

Paul Vanouse
SUNYBuffalo

Yasushi & Hiroshi Matoba

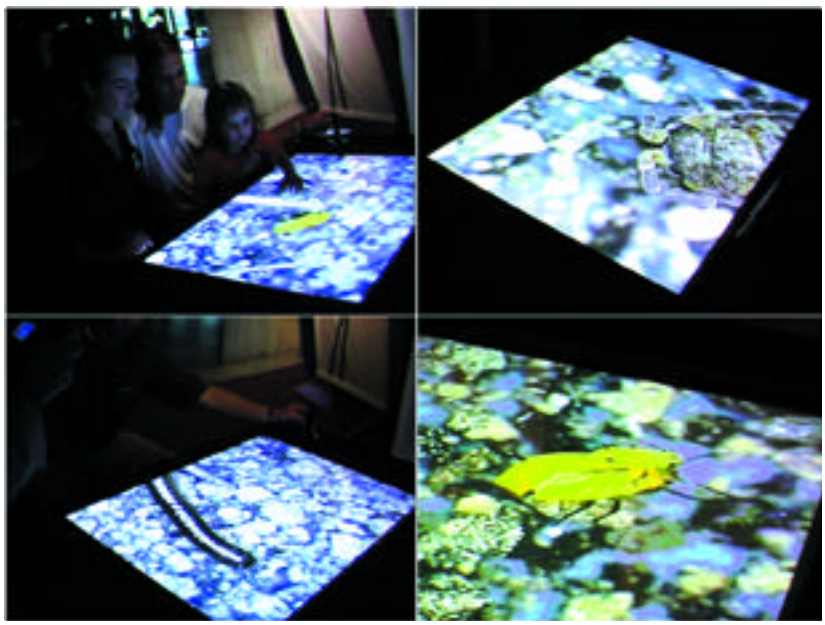
Small creatures surround us in everyday life. In our large-scale world, we sometimes are not aware of their existence. Sometimes these small creatures even anger or annoy us. Isn't it a pity that we have either no relationship or rather negative relationships with these small creatures? Couldn't we somehow have better, more intimate relationships with them?

With this instillation, humans can understand and communicate with small creatures. Its mechanism enables us to interact and create friendships with animals whom we might otherwise never notice.

The installation is composed of a table, a flat display monitor such as PDP, a rod set between the flat monitor and the table, a microscopic video camera, a 2D movable stage, and small insects. The rod is connected to an insect-sized rod inside the display. Movements of the large rod are mechanically converted into micro-sized movements on the small rod. The display screen shows a magnified view of the insect-sized interior (scaled so that the micro-rod in the display seems to really be connected to the large rod on the outside). Participants move this virtual rod to seamlessly interact with the small creatures in the display.

Participants can also use a joystick to control the position of the stage, move around the insect world, find their insect-sized friends, and come into better contact with them.

Micro Friendship is a new type of virtual reality that makes worlds of very different scales from our own appear seamless and naturally accessible to us. We hope that you can see the charm and character of these new worlds and make friends with creatures you've never known before.



Micro Friendship
Interactive installation
1 meter x 2 meters x 4 meters

Yasushi Matoba
Independent Artist

Hiroshi Matoba
NEC Corporation
matomato@highway.ne.jp

Los Hermanos de Destruccion Numero 6, from the series collectively titled Los Hermanos de Destruccion provides a pop-art take on the mythology of nature, using media to explore ancient themes of humanity's relationship to nature's destructive forces.

Who is this mysterious figure, this menacing Paul Bunyan? She is influenced by Pecos Bill and other American folklore characters, spaghetti Western movies, and Jose Guadalupe Posada's Day of the Dead cartoons, as well as recent news reports of various natural disasters.

These giants suggest a 19th century version of the mythical Titans, unleashed in a 20th century apocalypse such as the San Francisco earthquake of 1906. The giants of the old myths had to fall to create our present universe, but they've always been with us. The earth was created from the body of Ymir in Norse mythology. Adam Kadmon of the Kabbala supposedly contained heaven and earth within his limbs. Prometheus was martyred by Zeus for giving Man fire. There are all these powerful earth forces. I'm sure every culture has some variation on the Titan story. This is my personal variation.

All the artwork was created digitally, combining scanned images, images captured with a digital camera, and objects created with 3D modeling software.

Los Hermanos de Destruccion Numero 6
Ink-jet on Val-Hues photo glossy paper
21 inches x 13.5 inches

Kelly McFadden
Jettrash1@aol.com

Conor McGarrigle

Spook... is a distributed net.art project that explores issues of surveillance, tracking, and covert activity on the Web in an interactive Web site based on the conventions of computer games.

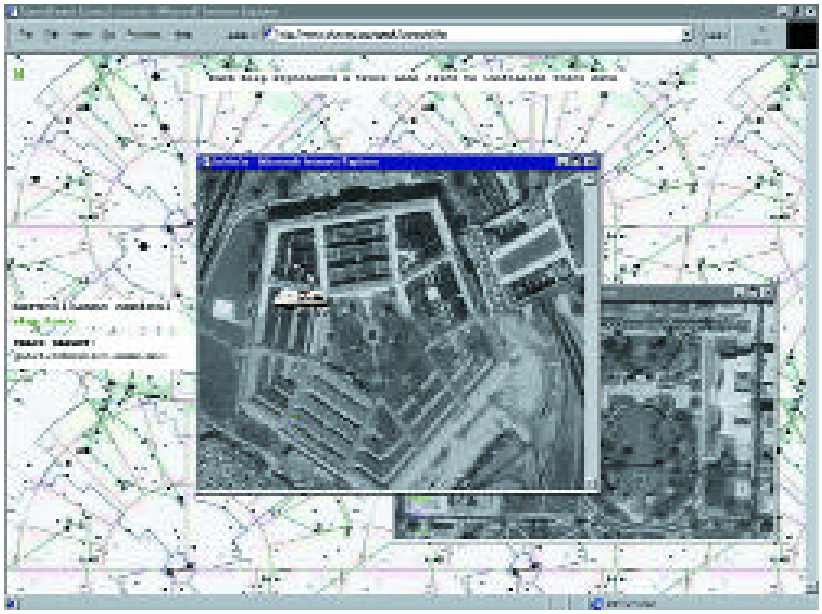
On 1 June 1999, an unusual pattern of hits from military servers was noticed on the Stunned ArtZine site. A high level of activity was noticed from one server in particular. In an attempt to find out the reason for this, we decided to find out where else this server had been and who else they were looking at. It was time to watch the watchers...

A server trace was initiated using the Stunned Spook-Bot, which tracked the military server's path through the net, mapping and logging its activities. The resulting data form the basis of Spook...

Spook... goes behind or underneath the Web to use as its raw material the traces of movement through the Web. It discovers paths and tracks left behind, which reveal patterns of purpose. As we move through the Web, we create an alternative web of links and connections, an underground Web that, unknown to many, creates personalised histories that can not be erased or cleared and that are available to those who know how to find them. The significant maps and mapmaking activities on the Web are personal, maps that have a defined purpose. Spook... analyses these maps and attempts to deduce their purpose.

Spook... presents more than 50 sites visited by the same server and invites users to help establish the connections between these sites and post their theories to the Spook... site. Spook... is an ongoing project, and users can nominate their favourite military servers for tracking by the Spook-Bot. The results are added to the site:

www.stunned.org/spook



Spook...
Web site

Conor McGarrigle
conor@stunned.org

Mark Millstein

These kites combine digital imagery with traditional construction techniques. The surface design combines elements of photography, drawing, and painting. The composition influences the shape and division of the whole kite. Finished airworthy kites are constructed from ink-jet printed paper, bamboo, and string.

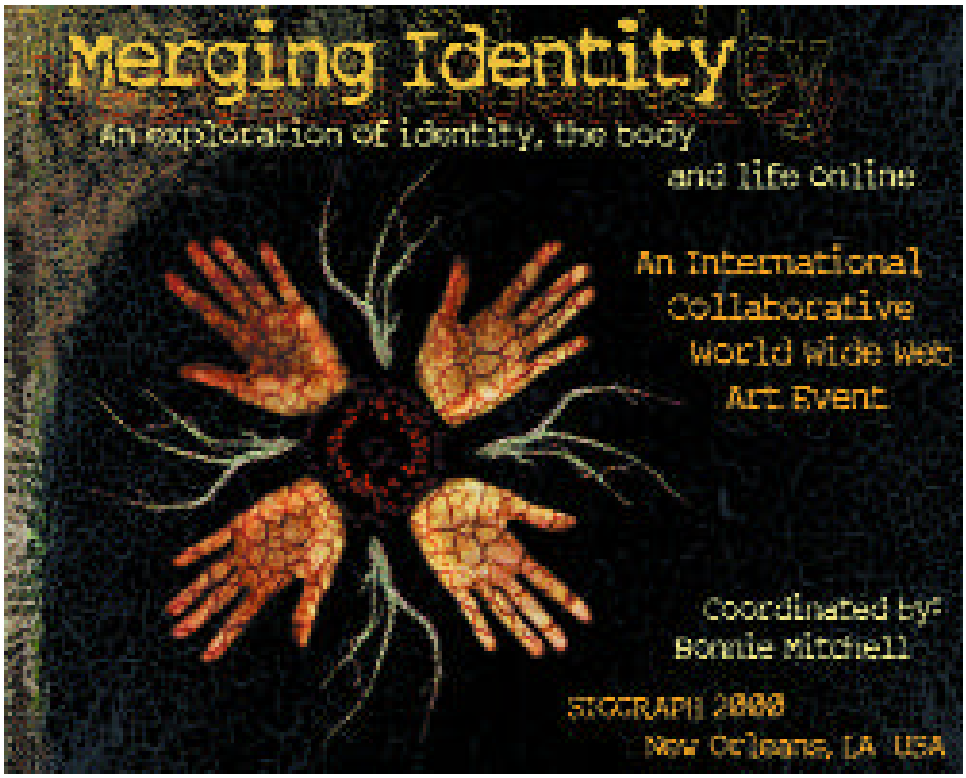
Tall Sumac Kite
Ink-jet print
59 inches x 25 inches x 4 inches

Mark Millstein
University of Massachusetts, Dartmouth
mmillstein@umassd.edu

"Merging Identity" is an international World Wide Web art event that enables individuals to collectively explore the evolution of creative expression through manipulation of each other's ideas. As members of a global Internet community, our identity is defined not by our physical selves but instead by our ability to express ourselves via text and images. As we enter into dialog and interaction in our new world, we leave behind the body. Gender, race, and physical appearance are no longer a defining characteristic of our social selves. Without the body, identity can be boiled down to an email address, words, and images. Rather than freeing us, the loss of the body begins to decompose our individuality and unify us into one large homogenous global identity.

"Merging Identity" enables participants to collectively explore the ways in which the body has helped shape our individual identities. Participants respond to each other's WWW contributions by submitting visual, audio, and text-based responses to the Web site. Collaborators are invited to take someone else's idea and expand, manipulate, or mutate it to become a new idea and then resubmit it to the site. This enables ideas to flow and evolve freely as interactive artistic dialog expands the realm of possibilities. The site is fully automated so that contributions are instantly added to the site and existing pages are updated. Images are automatically converted to various interactive and animated formats, and poetry becomes hyperlinked journeys through ideas.

Before the event, over 2000 invitations were sent to individuals in 20 countries. "Merging Identity" is an active event during festivals and shows and open to show attendees to participate. During, and after the event the evolution of ideas is documented at: creativity.bgsu.edu.edu/identity



Merging Identity: Exploration of identity, the body and life online
Main page of Web site

Bonnie Mitchell
Bowling Green State University
bonniem@creativity.bgsu.edu

Marjan Moghaddam

In the Adorations series, computer-generated 3D female humanoids explore the pictorial space of classical painting, seeking their origins as representational and Euclidean visual constructs. As basic humunculi with their own inherent fractal and procedural dermal pigmentation, they return our mesmerism of screen-based artificial realities with adorations of their own evolutionary origins in machines and cultural artifacts that defined our shift towards Post Humanism.

In Adoration of Gas Tank, the tank is loosely based on the gas tank of a 1967 Triumph Bonneville motorcycle, one of my favorite bikes. It sat on my lap, and occasionally on the table, as I modeled it on the computer. When I finished, I held the gas tank in my my arms. It felt comfortable and nice to embrace. Another post-humanist, machine-based extension of our bodies, the digital entity finds and adores... Faster Pussycat...

The print-based images are entirely computer-generated and make no use of scanned elements. The scenes consist of computer-generated 3D virtual environments, with high-density geometry, that are rendered at high resolutions for output to archival digital C-prints (200MB per image). The entities and their associative "space" are mapped with high-resolution fractals and procedurals that define the self-similar patterns of their non-material informatics realm. The digital C-prints are cold-press mounted on anodized aluminum, matted, and framed with acid free materials and plexiglass.

Adoration of Gas Tank
3D CGI output to archival digital C-print (luminage process output to Fuji crystal archive paper)
40 inches x 32 inches x 4 millimeters

Marjan Moghaddam
marjan@marjan.com

"... like an earthquake that suddenly comes into your life and reduces your life into nothing, and when you return to normality your perceptions, your feelings are different. Everytime I see a landstorm, I remember my own landstorm. Very personal... it's like a little secret always I have with me."

JUAN MIRANDA, Shock in the Ear

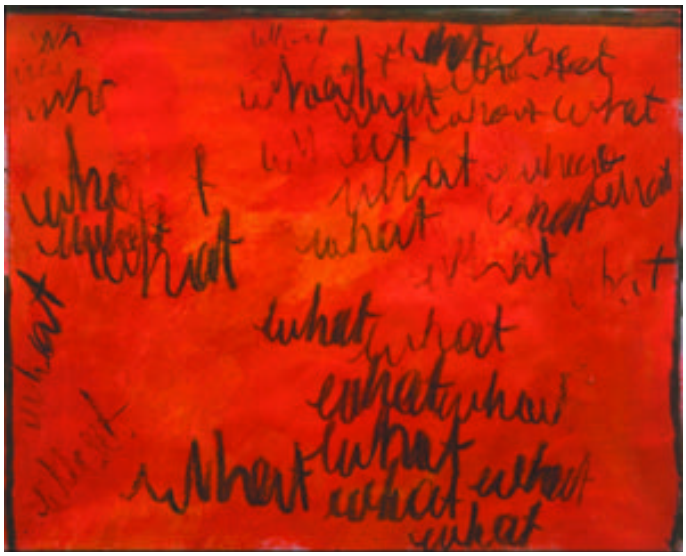
Shock in the Ear is is an experimental new media art work. It evokes the moment of shock and its aftermath as a sensual experience. From culture shock to electric shock and reverberating beyond into shock aesthetics, shock resonates with deep and abrupt physical and psychic change.

The project of Shock in the Ear is to engage the user at a sensual level with shock as a bodily experience — to evoke shock not at the crashing sensational moment of impact but in its sensual aftermath. It aims to disrupt perceptions as the user explores the moment after the event — a dislocated time/space of shifted perceptions and senses.

Shock in the Ear expresses the shocking concept that sound is essential to interactivity, as a new and engaging artistic form, because sound goes beyond the interface, into time, into the body, and into the imagination. Visually, the work disrupts conventional CD-ROM aesthetics and kinaesthetics, with its painterly, textured, and sensuous images, which interrogate painting conventions and history, and play with the relation between painting and multimedia.

Creating and articulating sound and image together in an innovative way, Shock in the Ear engages with interactive possibilities beyond simple point-and-click, immersing the user in emotional, sonic, and visual texture. At the moment of interactivity, the work opens up the CD-ROM medium's potential for intimacy.

Shock in the Ear is an intense and poetic work, composed through interactive screens, stories, performances, music, and sound. Refusing the slickness and control of cyberspace, the work explores instead the potential of new media for poetic movement, understandings, emotions, and sensations.



SHOCK IN THE EAR

Interactive CD-ROM

Shock in the Ear was developed with the assistance of the Australian Film Commission. The assistance of the New Media Arts Board of the Australia Council for the Arts, the Listening Room (ABC Radio Arts), and The University of Technology, Sydney are gratefully acknowledged.

Concept, direction, and sound
Norie Neumark
nn37@cornell.edu

Visual concept, painting, and design
Maria Miranda

Music
Richard Vella

Technical Producer and Programmer
Greg White

Interface Consultant
David Bartolo

In this artificial life environment, individuals, represented by graphic filaments, are endowed with their own intelligence and character. They can interact, exchange information, and reproduce. Through genetic mutations, the population evolves and progressively develops adaptation. The emerging behavior is rendered as continuously new shapes and graphical patterns.

The installation consists of one rear-projected screen that represents the artificial life environment. Observers interact with the artwork itself, transmitting "energy and life" to specific zones of the environment. A video camera detects the positions of the observers, and these locations become zones of life germination. Each filament contains a sound message, which is sent to a sound synthesizer. The global result is an environment of parallel sonorities that progressively create coherent sound architectures.

The main objective of the artwork is to build a metaphor of communication dynamics and "collective messages." The work is inspired by complexity theory as a new area of interference between art and science. In this paradigm, complex systems of multiple individuals develop global behavioral properties through local chaotic interactions (self-organization).

The results characterize the expressive elements of "Relazioni Emergenti" as emergent behavior in the sense of aesthetic shapes, either in terms of emergent relations between the artist, the artwork, and the observers, or in terms of concepts that emerge as the artificial-world metaphor produces hypotheses for the real world.

Relazioni Emergenti
Interactive installation

Mauro Annunziato
Piero Pierucci
Plancton Art Studio
plancton@plancton.com

Thomas Porett

TimeWarp-Philadelphia was originally a multiply exposed street scene shot in the late 1960s. Three negatives were combined in software and masked to permit only small areas of color to show through. The piece conveys a sense of time flashback along with spatial complexity and surprise.

TimeWarp-Philadelphia
Color Iris print
7 inches x 32 inches

Thomas Porett
The University of the Arts
tporett@dimagery.com

Rhizome.org

Each time someone reads a text at Rhizome.org, a dim star appears on a black Web page. When a text is read again, the corresponding star gets a bit brighter. Over time, the Web page comes to resemble a starry night sky, with bright stars corresponding to the most popular texts and dim stars corresponding to less-popular ones. Clicking on a star triggers a special pop-up menu. The first menu option allows you to read the text that corresponds to the star. The second menu option allows you to select a keyword associated with that text. After selecting a keyword, Starrynight draws a unique constellation of stars whose texts share that keyword. You can use these constellations to find other related texts, and in doing so, follow your interests through the vast array of ideas and information in the Rhizome.org archive.

www.rhizome.org

Starrynight
Web site interface

Alex Galloway
Mark Tribe
Martin Wattenberg
Rhizome.org
alex@rhizome.org

Daniel Rozin

Wooden Mirror explores the line between analog and digital. The essence of the piece is the notion of inflicting digital order on a material that is as analog as it gets: wood. I was hoping to take the computational power of a computer and video camera, and seamlessly integrate them into the physicality, warmth, and beauty of a wooden mirror.

The piece reflects any object or person in front of it by organizing the wooden pieces. It moves fast enough to create live animation. The simple interaction between the viewer and the piece removes any uncertainty regarding its operation. It is a mirror. The non-reflective surfaces of the wood are able to reflect an image because the computer manipulates them to cast back different amounts of light as they tilt toward or away from the light source. The image reflected in the mirror is a very minimal one. It is, I believe, the least amount of information required to convey a picture (less than an icon on a computer and with no color). It is amazing how little information this is for a computer, and yet how much character it can have (and what an endeavor it is to create it in the physical world).

Wooden Mirror produces a distinctive sound when something moves in front of it: the sound of hundreds of tiny motors. The sound is directly connected to the motion of the person in front of the mirror and provides a pleasing secondary feedback to the image.

All the construction of this piece was done by hand, including mechanical connections and wiring. It took 10 months to build the mirror.

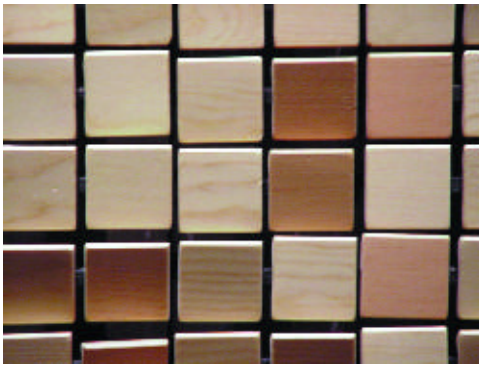


Photo: Marianne K. Yeung

Detail of wooden pixels and camera.
(pixels are 1.5 inches x 1.5 inches).

Wooden Mirror 1999
Wood, motors, video camera, computer
70 inches x 60 inches x 6 inches

Daniel Rozin
danny.rozin@nyu.edu

Philip Sanders

The Hyperaesthesia and PostHyperaesthesia panoramas explore the relationship among perception, preconception, and meaning. They are constructions of interrelated virtual worlds, individual panoramas that extend painting into four dimensions. These two series present a dialogue between an individual's internal views and physical or social realities. They juxtapose actual-seeming places and objects with conceptual, archaeological, and painterly images. Although the Hyperaesthesia panoramas seem to present a photographic realism, everything has been constructed or revised with digital techniques; the PostHyperaesthesia series explicitly works with this revisionary process. Extending this temporal process along a spatial axis gives a viewer the ability to explore and recreate the process of creation. The idea is to create a metaphor that acts as a resonant framework that mediates among the external world, the artist, and the viewer.

NYC NIGHT/SAMURAI
Hyperaesthesia and PostHyperaesthesia:
Hyper-3D Paintings in QuickTime VR

Philip Sanders
ps@thing.net

Jim (Aristide) Scott

This piece is a social commentary modeled after the design influence of the Russian Constructivists. The corporate brand mongers have created an infantile consumer monster with a voracious appetite.

These mongers attempt to control the beast in order to get its valuables for the corporations.

Consume 2
C-Print
52 inches x 52 inches x 3 inches

Jim (Aristide) Scott
Night Netwerk Productions
jim@nightnetwerk.com

Sponge

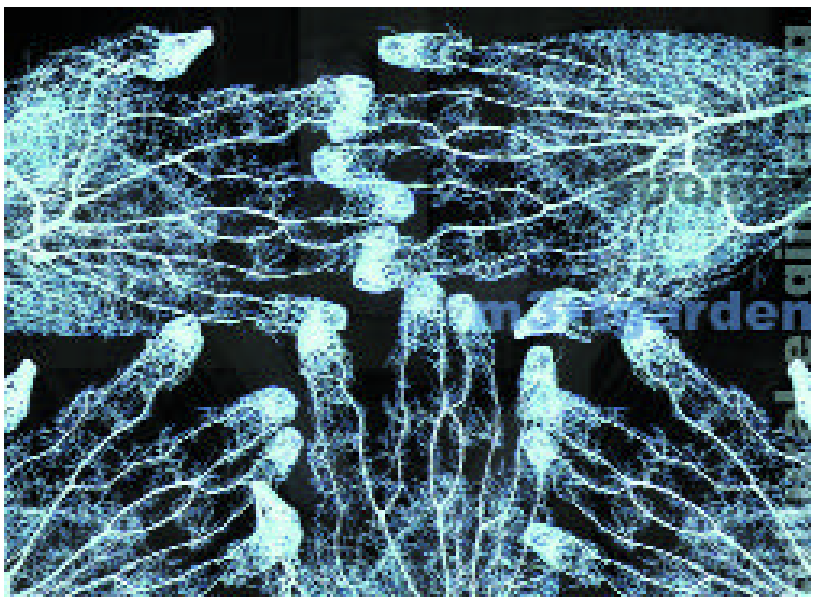
T-Garden is the third room in a proposed performance and social investigation called M3. It is a responsive environment where visitors can put on sound and dance with images in a tangible way to construct musical and visual worlds "on the fly." The play space dissolves the lines between performer and spectator by creating a social, computational, and media architecture that allows the players to shape patterns in the dynamical environment.

As visitors enter the performance space, they find an array of sumptuous clothing that they can choose to wear. The clothing has specific exaggerated physical qualities (for example, weight, size, and material). It is embedded with wearable sensing, computing, and signal processing devices as well as small audio speakers. Individually, the visitors enter into several separate vestibules or rehearsal studios where they can play with streams of sounds and compositional effects broadcast by wireless audio throughout the room. They can explore the aural and physical properties of their garment-instrument, and gradually learn how to modulate and change the sounds they are receiving.

After practicing, the players enter a circular room thick with sound and image. The curved walls and floor are covered with transforming, polymorphous video and computer-generated textures: archaeologies of bodies, aquatic organic forms, elemental and microscopic liquid, and solid state changes. These phantasmagoric textures appear to breathe and dance according to the sound patterns in the room. In this garden, as the visitors pass near each other, their clothes appear to howl and squeal, as if patterns of sound and image are "bleeding" from one body to another. As the visitors move about, their locations and groupings strengthen and lighten the density of the visual environment while varying the melodic and rhythmic aspects of the sound space. Memory, population density, and bodily proximity affect the dynamics of the room, causing growth, decay, infection, and contamination in the visual environment. Embedded performers also inhabit the room and affect the basic sound structures of the environment, providing the cantus firmus in a dense and changing polyphony of rhythms and melodies generated by the visitors' gestures and motions.

The room's media are stirred not by explicit speech and command but by half-noticed gestures and flows of fabric and resonating air that halo the participants'conscious activity.

sponge.org



M3:T-Garden

Sha Xin Wei
Chris Salter
Laura Farabough
Maja Kuzmanovic
Evelina Kusaite
Cynthia Bohner-Vloet
Sam Auinger
Joel Ryan
Ozan Cakmakci
Kristof Van Laerhoven
Els Fonteyne
Walter van de Velde
Adam Lindsay
David Tonnessen
xinwei@stanford.edu

Jack Stenner

"Satisfaction" is a 3D animation that attempts to communicate the fleeting satisfaction of our desires in a humorous way. A solitary mouth signals a balloon to "partake" of it's services, and we observe the less than satisfactory result.

Satisfaction
3D animation

Jack Stenner
Texas A&M University
stenner@pursebuilding.com

Andrew Stern

In her recent book, "Hamlet on the Holodeck: The Future of Narrative in Cyberspace," Janet Murray suggests that interactive virtual characters "may mark the beginning of a new narrative format," taking on the task of redefining what it means to be human in the face of artificial intelligence. This notion is fundamental to the design and implementation of Virtual Babyz, a CD-ROM program completed in October 1999.

In Virtual Babyz, the user plays with and takes care of a group of autonomous virtual babies that live in a virtual house on the computer desktop. The Babyz are real-time 3D animated characters rendered in a cartoon-like style. Using a mouse to control a hand-shaped cursor, users directly touch, tickle, and pick up the Babyz, as well as pick up and use toys and objects in the virtual house. Through voice recognition, users speak simple words, and the Babyz listen to and understand their speech in real time. They learn to speak back in "baby talk."

The Babyz immediately respond to the user's interactions with a variety of behaviors, depending on how the user interacts with them, how the Babyz feel at the time, and their individual personalities. A wide variety of body animations, emotional facial expressions, vocal sounds and baby-talk words are tightly integrated with a behavior-based artificial intelligence architecture. The result: characters that communicate their feelings and thoughts in a natural, performance-like way, rather than through traditional user-interface elements such as bar graphs, sliders, or text messages. Additionally, the characters have been specifically imbued with some long-term narrative intelligence, which further encourages users to experience their interactions as an ongoing "story."

In creating Babyz, we had two primary artistic and design goals. The first was to create the strongest interactive illusion of life we possibly could on a personal computer. This was achieved through a novel combination of a direct-interaction interface, expressive real-time 3D animation, and artificial intelligence programming that models goals, motivations, personality, and emotion. The final effect is surprisingly compelling, and it should be of interest to artists and technologists alike. Babyz are among the strongest, deepest implementations of virtual humans available to the general public to date.

The second goal was to allow users to form emotional relationships with their Virtual Babyz. To achieve this, we chose characters that people recognize and understand how to interact with, presenting them in an unstructured, non-goal-oriented play context. The result is that users can easily suspend their disbelief and imagine that the Babyz are truly alive, so they feel empathetic, nurturing, and rewarded when interacting with the virtual characters, even over long periods of time. Users have already created over 100 Web sites for their adopted Babyz (www.babyz.net)

Additional team members for Babyz:
Rob Fulop, John Rines, Mike Filippoff, Andrew Webster, Jan Sleeper, Neeraj Murarka, Bruce Sherrod, Dave Feldman and Darren Atherton.

Virtual Babyz
Interactive installation

Lead Designer, Behavior Engineer, original concept
Andrew Stern

Design Consultant, Animation Design, original concept
Adam Frank

Character design tools and engineering
Ben Resner

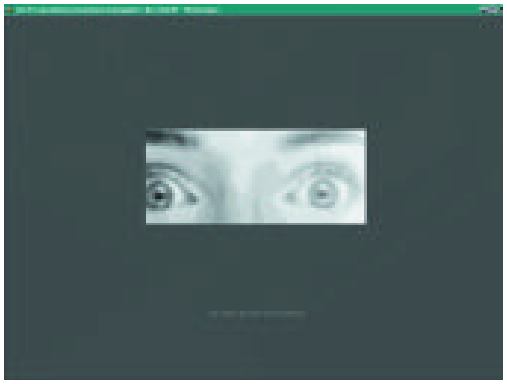
PF.Magic / Mindscape
apstern@ix.netcom.com
www.babyz.net

SINGLE, structurally equal to ALL, and endless in the microstructure sm-N shows the totality and brokeness of INTIMACY in her mirror image. ONE split into TWO is compatible with the life of INTIMACY. The magic structure of ONE and obsession with individuality inspires the ritual beauty of polarity, which is shown on the altar of art. The Story about INTIMACY is presented by a mathematical microstructure.

The circle is drawn and in the circle there is a whole world.

There is a world of the COSMOS and a world of the ATOM, but INTIMACY is the zone of their co-existence.

www.intima.org



SM-N
Sprinkling Menstrual Navigator
Internet Art Project

Igor Stromajer
INTIMA Virtual Base/Net Art Lab
atom@intima.org

Piotr Szyhalski

Die Zeitstücke explores the idea of human experience as the pivotal point in our perception of time. In this body of work, the user is invited not only to experience time in different ways, but to engage in its manipulation. This tampering with time occurs in a variety of manners: from unintentional loss of a few seconds here, to deliberate and absolute halt of the flow for minutes there, from attentive search for meaning in passing time to violent hurtling up and down the visible timeline, from desperate attempts to work against the relentlessness of time to quiet acceptance of the shifting physical manifestations of it.

Our understanding of "objective" time takes place largely due to our acceptance of time-measuring devices and the recognition of these objects as nearly synonymous to the idea of time itself. In Die Zeitstücke, the concept of time functions as a device to reflect on (and quantify?) such elusive themes as memory, faith, knowledge, and mortality.

Each component of Die Zeitstücke slowly but methodically evolves, creating a sense of continuous texture that is only fragmentarily experienced by the user. Soft, organic images of the human body combined with sharp grids and the mechanics of numeric display further emphasize the tensions between the subjectivity and the science of time.

The work combines all three dimensions of memory. As a device, it "remembers" every mousedown that users input during the display and allows retrieval of those records. Unearthing these moments in time creates the illusion of a "journey into the past" and, at the same time, becomes a form of "intelligence" collection, a surveillance procedure.

Die Zeitst cke (Timeworks)
Interactive installation

Piotr Szyhalski
piotr_szyhalski@mcad.ed

Michele Turre

What happens to old tires? On one level this animated storybook is a documentary photoessay on land use in New England. On another, it's a wistful deconstruction of landscape tropes from European painting and photography — pastoral to sublime, picturesque to postindustrial.

Tired Landscapes
www-unix.oit.umass.edu/~mturre/tired

Neoclassic, from Tired Landscapes
Animated storybook

Michele Turre
Turre Studio
mturre@art.umass.edu

Anna Ullrich

My recent artwork portrays female subjects who are in the midst of constructing a complex identity that takes the functional rationales of a technologically based society to its excessive extremes and uses its logic to serve their appetites for power, control, and sexual satiation.

The Siren is an image of a woman constructing an industrial form out of her hair using decorative braids and hair weaves. The physical prowess of men is fueling the regeneration of her hair, which is swallowing the landscape and the men upon it.

The Siren
Ilfochrome print
35 inches x 58 inches x .05 inches

Anna Ullrich
Adobe Systems, Inc.
siggraph@annau.com

Camille Utterback, Romy Achituv

Text Rain is a playful interactive installation that blurs the boundary between the familiar and the magical. Participants use the familiar instrument of their bodies to do what seems magical: lift and play with falling letters that do not really exist.

To interact with the installation, participants stand or move in front of a large projection screen. On the screen, they see a mirrored video projection of themselves in black and white combined with a color animation of falling text. Like rain or snow, the text appears to land on participants'heads and arms. The text responds to the participants' motions and can be caught, lifted, and then let fall again. The falling text "lands" on anything darker than a certain threshold and "falls" whenever that obstacle is removed.

If participants accumulate enough letters along their outstretched arms, or along the silhouette of any dark object, they can sometimes catch an entire word, or even a phrase. The falling letters are not random, but lines of a poem about bodies and language. As letters from one line of the poem fall toward the ground, they begin to fade, and differently colored letters from the next line replace them from above. "Reading" the poem in the Text Rain installation, if participants can do so at all, becomes a physical as well as a cerebral endeavor.

Supported by Interval Research Corporation, The Interactive Telecommunications Program at New York University, and The Greenwall Foundation.

Text Rain
Interactive installation
screen: 4.5 feet x 6 feet

Camille Utterback
Romy Achituv
clu2oo@nyu.edu

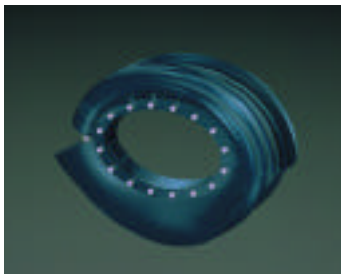
Interactive Telecommunications Program, New York University

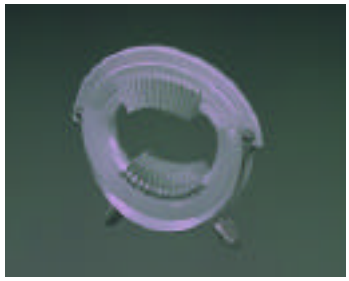
Kimberly Voigt

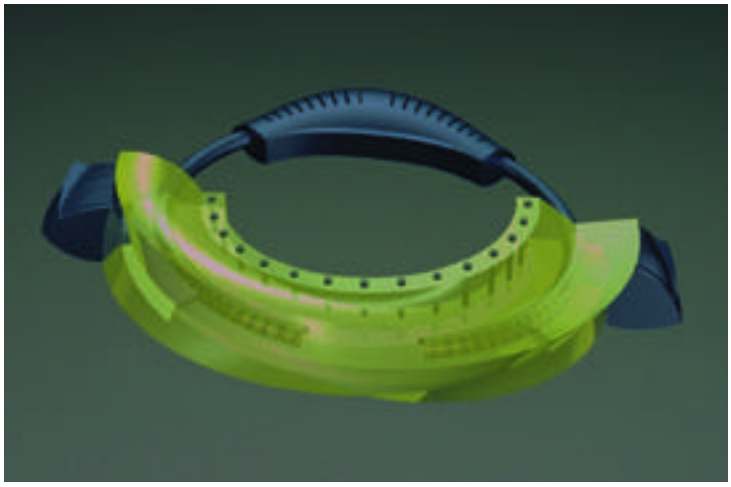
Digital Jewelry Explorations is a collection of armpieces and neckpieces that explore the aesthetic beauty of unique 3D wearable objects and challenge traditional adornment issues. My motivation stems from my passion for and fascination with the human body: primarily, how 3D forms can accentuate, define, and interact with our bodies.

I'm also intrigued by the primal need to define who and what we are through the intimacy of personal adornment, and how I as an artist can bring "real" meaning back into this ritualistic experience. I'm striving to create a formal visual language that speaks about the integral aspects of the environment of creation, the process of production, and the modalities of wearable art in a sophisticated, technologically driven society.

From concept to production, this body of work is a manifestation of my desire to integrate my creative investigations with state-of-the-art technology, specifically CAD/CAM/RP technologies. Through my work, I hope to reach a new audience of individuals, who embrace the age-old desire of personal adornment but are willing to experiment with and redefine the parameters of what personal adornment will mean to human beings in the 21st century.







Digital Jewelry Explorations
3D tangible objects & 2D prints
12 inches x 16 inches x 5 inches

Kimberly Voigt
AKIMBO Inc.
kimvoigt@earthlink.net

VRML-Art 2000

VRML-Art is an international juried selection of 3D Web and VRML projects created for the Internet. VRML-ART.ORG began in 1999, as part of the VRML/Web3D conference. Each year, selections from approximately 25 countries show the content and innovation of fine artists, alongside the technical applications and developments of 3D experts.

Kosovo (1999)
This is no game, but rather a careful observation of a deadly serious adventure. "Kosovo" is a futuristic exploration that incorporates both user-defined motion and system-defined animation.

Merzbau (1999)
A re-creation of the 1923-1936 Kurt Schwitters Merzbau, the famous Dada workspace. An interactive node of the KS Virtual Museum System, created by VanGogh TV for the Sprengel Museum, Hannover.

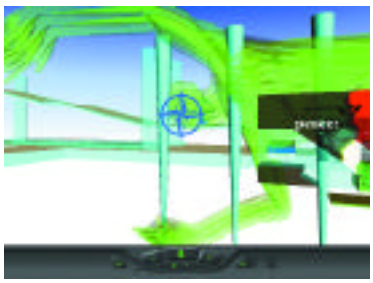
netzhaut [retina] (1998-2000)
An online space for non-verbal communication, where several users can access a 3D virtual world from different locations. Created at the C3: Center for Communication and Culture, Budapest.

Virtual Casino (1999)
A commercial application that can be enjoyed without login or coins. This NMS data visualization shows innovative uses of a slot machine that acts in real time with dynamic data.

interactive space (1999)
This interactive sound and visual space allows navigation and interaction with a distorted wireframe structure by filling in planes that can be animated to generate different sounds, which creates a sound body.

TeleZone (2000)
A project of Ars Electronica Center and Telekom Austria AG. TeleZone is a telerobotic art installation that creates a parallel between the real and the virtual using a CAD interface within the virtual space and the real space of the Ars Electronica lobby.

www.vrml-art.org

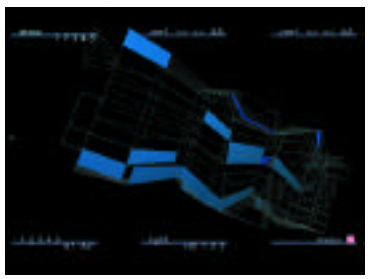


Kosovo (1999)
Steve Guynup
Atlanta, Georgia USA

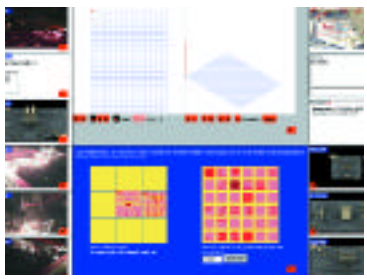
Merzbau (1999)
Zvonimir Bakotin
Split, Croatia

netzhaut [retina] (1998-2000)
Programme 5: Lilian Juechtern and Nicole Martin
Berlin, Germany

Virtual Casino (1999)
Seung-Yeon Kim
Korea Telecom International
Seoul, Korea



interactive space (1999)
Kai Strehlke
ETHZ
Zurich, Switzerland



TeleZone (2000)
Eric Berger
Linz, Austria

Co-Organizers
Kathy Rae Huffman
Karel Dudesek
kathy@vgtv.com

The story of hypermedia, in which the Web is a recent chapter, begins with a vision of transforming the brain's associative connections into media (media that can be infinitely duplicated and easily shared), creating pathways of thought in a form that will not fade with memory. In recent years, hypermedia has begun to permeate our lives. But it is not as we dreamed: constantly growing, with nothing lost, only showing what we wish to see. Instead, "Not Found" is a nearly daily message.

The story of software agents begins with the idea of a "soft robot" capable of carrying out goal-oriented tasks while requesting and receiving advice in human terms. In recent years, a much narrower marketing fantasy of the agent has emerged (with a relationship to actual agent technologies as tenuous as Robbie the Robot's relationship to factory robots), and it grows despite failures such as Microsoft Bob. Now we often see agents as anthropomorphized, self-customizing virtual servants designed for a single task: to be a pleasing interface to a world of information that does not please us.

The Web disappoints us with its too-perfect reflection of our ambivalent relationships with impermanence and openness: dynamic and unstable, diverse and overwhelming. In response, some Web businesses are marketing fantasies of agents that will find for us only the information we desire and shelter us from chance encounters with unpleasant content and broken links.

The Impermanence Agent is a different response. It interacts with users as a Web-browser window. The Agent tells a personal story, a story of impermanence. The Agent is meant to be experienced peripherally, over time, not "visited." It tracks the user's Web browsing, makes copies of the texts and images the user views, and then customizes its story by incorporating this material. The Agent customizes until none of its original story is left.

THE IMPERMANENCE AGENT
Narrative alteration and reaction to Web browsing

Noah Wardrip-Fruin
a.c. chapman
Brion Moss
Duane Whitehurst
New York University
noah@mrl.nyu.edu

Annette Weintraub

Crossroads is a Web project that explores the capacity of film and advertising culture to shape our sense of place. It creates a series of metaphorical spaces that are constructs of the mythic and actual Times Square/42nd Street area and extends to explore New York as a film location. The viewer can enter multiple narratives in the form of "pseudo films": animated images and a mix of ambient sound, audio monologues, and animated texts. These "pseudo films" incorporate aspects of film genres that are closely identified with Times Square: noir, the B-movie, the musical, and the coming-to-New-York story. Crossroads establishes a dynamic space in which the familiar architectural and commercial icons of Times Square and 42nd Street are reconfigured in a mix of personal myth and public space. Evironment and architecture become the scrim for projections of memory and imagination.

My work explores the urban environment and architecture as visual language. While my projects explore the visual vocabulary of architecture, there is also an underlying investigation of the cultural and social meanings of the architectural landscape. This work develops new narrative structures that incorporate simultaneous, multiple narratives in image, text, and audio within a constructed space.

www.turbulence.org or (direct link)
www.turbulence.org/Works/crossroads/index.html

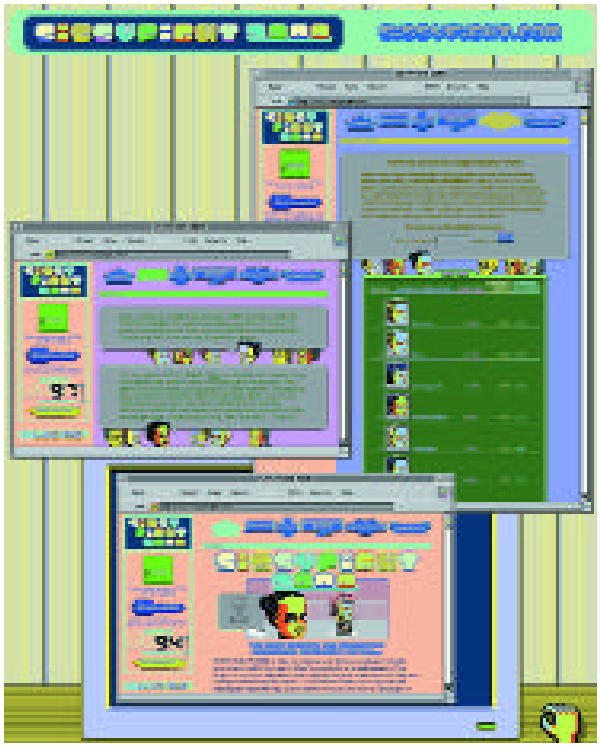
Crossroads (Wonder: Suspended in Air)
Web site

Annette Weintraub
City College of New York
anwcc@cunyvm.cuny.edu

SiSSYFiGHT2000 is an intensely social, super-stylish and devilishly humorous online game for three to six players. Players participate in a down-and-dirty schoolyard catfight with other girls, using scratches, grabs, teases, and tattles to break down the self-esteem of other players and leave them crying under the tetherball pole. The game takes advantage of Macromedia Shockwave's powerful online capabilities to create a Web-based multiplayer environment where players from all over the world can compete. Developed to introduce new ideas into the culture of digital gaming, SiSSYFiGHT2000 is a strong step toward making games a vibrant pop cultural field that is as rich as music or film, without the genre ghettoization that plagues most of today's dark, fast-moving action-based game design.

SiSSYFiGHT2000 is designed to appeal to people who don't normally play games. With a mix of pop-culture references and sophisticated parody, its bright, clean visual style is completely different from the look of most online games. The gameplay of SiSSYFiGHT2000 is also innovative; social and communication skills are as vital to winning the game as strategic thinking. SiSSYFiGHT2000 is spawning a vital online community, as players compete for points, talk schoolyard trash, and reduce each other to tears 24 hours a day.

www.sissyfight.com



SiSSYFiGHT 2000

Executive Producer
Marisa Bowe
Word.com
mbowe@word.com

Game Design & Project Management
Eric Zimmerman

Lead Programmer
Ranjit Bhatnagar
Word.com

Art Director
Yoshi Sodeoka
Word.com

Art & Interface Design
Jason Mohr
Word.com

Producer & Assistant Game Designer
Tomas Clark
Word.com

Sound and Music
Lem Jay Ignacio

Additional Programming
Wade Tinney

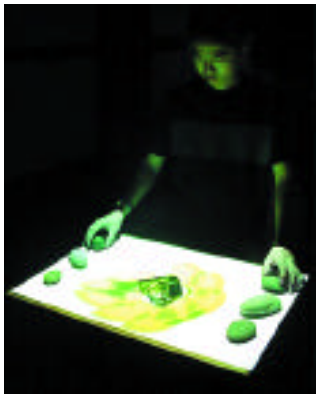
Communication Engine Programming
Lucas Gonze

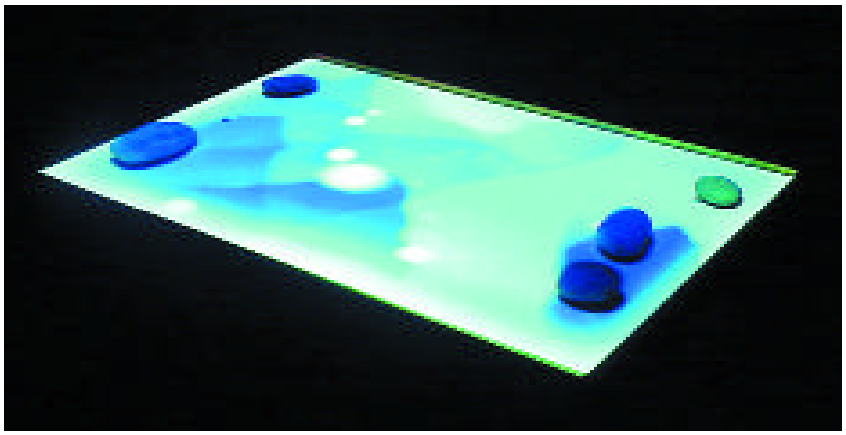
Additional Text
Daron Murphy
Word.com

Additional Project Management
Michelle Golden
Word.com

Guan Hong Yeoh, Yulius

Research into "stone" as a metaphoric representation of nature's influences on human development in art and the urban environment, and how these factors engage with technology today. Movement, change, light, growth energies, materials, the textures and sound of natural elements — these natural elements bring great changes to human art development and process. By encouraging people to study these basic principles and the concepts behind them, we will be able to apply them to our future designs. The aim of this installation is to let users experience the processes of development in human art, natural environments, and sounds through the technology of today.





The H.E.A.R.T of Stone

(Human Experiences Art Reflection Technology)
Interactive installation

Top left: A poster design that illustrates the ideas of the H.E.A.R.T of Stone installation.

Top right: A user interacting with and moving the stone on the board. The user experiences a "different environment" (visual animation) projected on the board. The "different environment" changes according the user's interaction and the weight of the stone.

Bottom: One of the scenes in which users interact with the stones and arrange them on the board. A "snow" environment will appear.

Guan Hong Yeoh
Wanganui Polytechnic
School of Design
ygh26@hotmail.com

Yulius
Wanganui Polytechnic
School of Design

Jen Zen (Jennifer Jen Grey)

The red figures are "cyber-touch shells," created in virtual reality by petting actual human beings, head-to-toe. Flattened views of the originally life-sized, 3D forms are curious images of limbic kinesthetic experience. I have them spinning on Devil's Racetrack in Death Valley, an elementally awesome place.

Final Spin
ColorSpan digital graphics on canvas
30 inches x 20 inches

Jen Zen (Jennifer Jen Grey)
jgrey@csulb.edu

Collaborator
Sheriann Ki Sun Burnham

Hardware and Software Support
Caltech Responsive Workbench, Cyberglove, Stereoscopic Glasses, Surface Drawing, Adobe Photoshop 4.0, Painter 5.0, Bryce 4.0, ColorSpan Display Maker XII (Duganne Atelliers Fine Art Prints)

Eric Zimmerman

BLiX is an elegant and innovative computer game that uses approachable gameplay and stylish pop aesthetics to engage with and expand the culture of digital gaming.

Eric Zimmerman
e@ericzimmerman.com

Animation

Bruno Follet

Graphic experimentation: a tiger in the town...

Wand-da

Bruno Follet
Heure Exquise! Distribution
exquise@nordnet.fr

Directors
David Hooghe
Fabrice Thumerel
Olivier Vernay

Producer
SUPINFOCOM

Animation
John Banks

Nocturn is a series of memories of night places. These scenes, from a larger work in progress, are idealized versions of remembered events. The images are from travels in Thailand, Moorea, and Europe.

The animation composites are derived mostly from still images, manipulated in Photoshop, and animated with After Effects. The work grows organically, each scene based on the previous image.

John Banks
Artek Images
jsbanks@interaccess.com

Director
John Banks

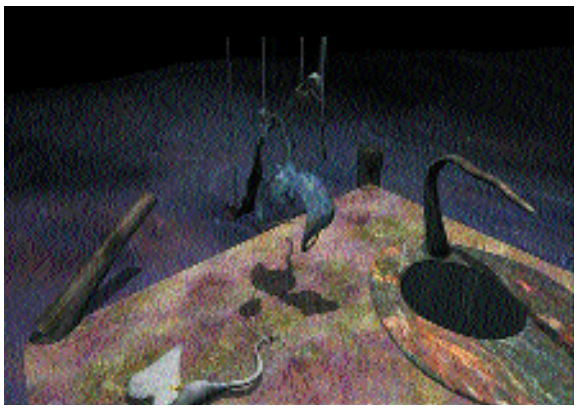
Producer
John Banks

Images and animation
John Banks

Music
Fritz Heede

Animation
Laurent Merot

In a theatrical world, a strange puppeteer manipulates two spindly marionettes. But one of them dies...



Cyclique

Laurent Merot
CNBDI–LIN
din@cnbdi.fr

Director
Laurent Merot

Producer
CNBDI–LIN

Music Contributors
D. and M. Fano
S. Neuhardt
N. Cong

Contents

Computer Animation Festival

Joe Takai
Industrial Light + Magic

Committee

Chair

Joe Takai
Industrial Light + Magic

Committee

Athena Portillo
Festival Coordinator
Industrial Light + Magic

Brice Parker
Post Production Supervisor

Jill Smolin
Animation Theater Director
Cinesite Visual Effects

Cynthia Basler
Animation Theater Producer
Industrial Light + Magic

Martin Calderon
Technical Advisor / DBA
Industrial Light + Magic

Kathryn Otoshi
Production Designer
Industrial Light + Magic

Ladd McPartland
Film Editor
Industrial Light + Magic

Leslie Barfield
Outreach
L.A. Barfield and Associates

Sande Scoredos
Computer Animation Festival
Chair – SIGGRAPH 2001
Sony Pictures Imageworks

Jury

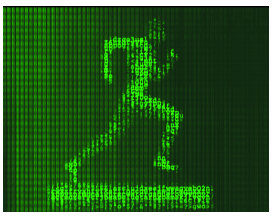
John Berton
Industrial Light + Magic

Carolyn Williams

David Newton

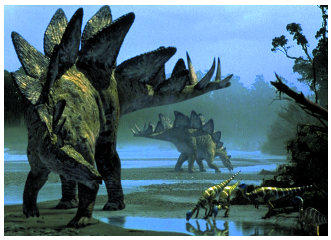
Judith Crow
The Secret Lab

Laurie Burruss
Pasadena City College



Introduction

The following pages represent today's finest work in computer graphics and interactive techniques.



This year's showcase of the state of the art in computer graphics reflects visions that have been developed and communicated since early humans painted their stories on cave walls. For many thousands of years, human beings have used artistic vision and imagery to communicate and illustrate conscious thought and subconscious feeling. In the current and previous century, the moving image has expanded our ability to share our ideas with others, and the digital medium allows us to share those ideas with an infinite audience.

As we envisioned a thematic concept for the SIGGRAPH 2000 Computer Animation Festival, the turning of a new century played a central role. We hoped that looking forward from this point in time would be a more positive approach than focusing on a retrospective look at computer graphics through the end of the 20th century. Speculating, predicting, and wondering about the next 500 years of evolution provided a rich inspiration for the artists and scientists who contributed their work to the show.

I hope you enjoy the great collection of work we present here; I know I enjoyed the 18 months of preparation that went into it.

Acknowledgements

This show would not have been possible had it not been for the countless people who gave their time, energy, and support.

Setting out to produce the most significant annual show of computer animation is quite possibly one of the most daunting tasks I have every undertaken. In order to assemble the show, we first had to call for the appropriate material, hope that the worldwide computer graphics community would submit exceptional work, process over 650 entries (no small task), present the work to the jury, help them to select the best 120 minutes, and, finally, edit the show into its presentation format. All the while, the conference administration portion of the program was running full steam ahead to opening day, 23 July 2000. Quite an undertaking to say the least.

For countless late nights and long editorial sessions, Athena Portillo, Brice Parker, and Ladd McPartland kept the ball rolling. Assembling the Animation Theaters couldn't have happened without the great effort and dedication of Jill Smolin and Cynthia Basler. Leslie Barfield provided us with a much broader submission pool from which to draw excellent work for the scientific community. Kathryn Otoshi helped us to develop a great design sense as a background for the show. My deep appreciation for his vast technical knowledge and assistance goes to Martin Calderon and his production support efforts. Industrial Light + Magic contributed wonderful resources. Jim Morris, Gail Currey, Sylte, my managers and the team at Production Engineering, thank you for your patience and support.

The jury that selected this show did so voluntarily and with great energy. Carolyn, David, John, Judith, and Laurie selected a show that is an exceptional representative collection of the finest work computer graphics has to offer. Their selections reflect the depth of experience and understanding of excellence they each represent. My thanks go to each of them for being faithful to the fine tradition of the Electronic Theater.

My deepest thanks and appreciation to the following individuals for keeping us on track and making the show great: Anastasia Emmons, Ben Garvick, Brian Blau, Brian Nasseri, Brian Wong, Carol Brzezinski, Carrie Ewert, Chrissie England, Cory Evans, Craig Mirkin, Dan Howard, Dana Barks, David Moody, Diane O'Connor, Donna Fetke, Doug Swam, Erik Grieve, Eric Haven, Gayle Peterson, Gary Meyer, Jack Maniscalco, Joe D'Amato, Johanna D'Amato, Julie Creighton, Kelly McGrath, Kenn Moynihan, Kerri Torzewski, Len Thorn, Lloyd Hess, Lorelei David, Marc Diaz, Maria Hamre, Matthew Reed, Megan Smith, Mo Husseini, Robert Barker, Rob Bonstin, Robin Myran, Sande Scoredos, Sarah Peacock, Tom Lafferty, Tristan Tom, Wik Pampel and Yves Metraux.

And finally, to my family – Pam, Travis, Sean and Natasha: you keep my imagination fed and cared for.

Joe Takai
SIGGRAPH 2000 Computer Animation Festival Chair

Best of Show

Onimusha: Opening Movie of PS2

This animation was produced for the PS2 game “Onimusha,” which will be released by CAPCOM. In the production, we used an optical motion-capture system to capture six samurais battling simultaneously.

Software/Hardware: Softimage, 3D Studio MAX, Windows NTworkstation.

Taku Kimura
Links DigiWorks Inc.
taku@links.imagica.co.jp

Director
Shimako Sato

Producer
Mikitaka Kurasawa

CGI Supervisor
Taku Kimura

Computer graphics by
LINKS Corporation

Motion captured by
IMAGICA Sakuratei-Studio, Links DigiWorks Inc.

Composed by
Mamoru Samuragouchi

Samanosuke Akechi by
Amuse/Fu Long Production

Guest Creator
Takeshi Kaneshiro

Jury Honors Award

Stationen

The Odyssey of life. The long way through a monotonous, hardly fertile world with its misleading influences. Losing yourself.

Christian Sawade-Meyer
Fachhochschule Hannover
contact@wired-illusions.de

Director
Christian Sawade-Meyer

Producer
Christian Sawade-Meyer

Alien Abduction

When ILM first approached me and my buddy about doing the opening for the SIGGRAPH Electronic Theater, I thought "what the hey," this would be a great opportunity to set the record straight about us aliens. We're always portrayed as mean, ugly losers, and this would be a chance to show what we're really like. OK, so maybe we are mean, ugly losers but that doesn't mean we don't have a sense of humor. When the humans threw in the bit about using the new Sony Digital high-definition camera, we couldn't resist. All aliens are techno-geeks at heart. Of course, the whole thing was a set-up. The human devils knew no two aliens could ever agree on anything, so they sat back and watched as we argued for months about the concept. By the time we had the script, there was a month left to produce it. How was it humanly possible to deliver a two minute movie in one month? Well, we're not humans. We're aliens and proud of it. We'll make that delivery date.

Director
Rick Schulze

Executive Producer
Marcie Malooly

Head of Production
Paul Grimshaw

Producer
Kip Larsen

ART DEPARTMENT
Art Director
Erich Rigling

Storyboard Artist
Benton Jew

Concept Artist
Kirk Henderson

LIVE ACTION CREW
Director of Photography
Don Smith

Assistant Camera
Mike Bienstock

Gaffer
James Childers

Electricians
Tom Cloutier
Scott Ferry

Key Grip
Carl Assmus

Grips
Toni Taubert
Gary McLendon

Video Engineer
Fred Meyers

Props Master
Emilio Aramendia

Props Assistant
Dave Watson

Make-up
Paula Jean Fredridkson

Wardrobe
Deborah Coleman

Script Supervisor
Michael Leperi

Sound Recordist
Greg von Buchau

Modelmaker
Anna Bies

Production Assistants
Todd Jefferies
Matt Powers

Casting Director
Shari Hanson

Still Photos
Shawn Casey

M.C. /Puppet
Michael Rae Sommers

Pud
Phil Snyder

Spud
Mendi Segal

CG CREW
Lead Animator
Izzy Acar

Animators
Skip Bittman, Shawnya Young, Greg Kyle

Technical Directors
Tripp Brown, Scott Prior, Jennifer McKnew-Bartels, Marie-Laure Laffitte, Jeremy Goldman

Compositor
David Gottlieb

Matchmover
David Manos Morris

Art Director
Erich Rigling

Lead Modeler
Howie Weed

Modelers
Alexander Pouchkarev
Ken Bryan

Enveloper
Dugan Beach

Chainer
James Tooley

Viewpainters
Catherine Craig
Terry Molatore
Derek Gillingham

Flame Artist
Orin Green

HDCam Video Wrangler
Lea Ravage

CG PRODUCTION
Head of CG Commercials
John RA Benson

CGC Production Manager
Justin Harwood

CGC Production Coordinators
Llesllе Aclaro
David Mammola

CGRA
Mike Balog

Video TA
Natalee Djokovic

FILM GROUP
Film Scanning Supervisor
Josh Pines

Film Scanning Technology
Joseph Goldstone

Film Scanning Operators
Randy Bean, Earl Beyer, Mike Ellis, George Gambetta, Todd Mitchell

Sound Design and Mix by
Skywalker Sound

Sound Designer/Mixer
Bob Edwards

V.O. Recordist
Eric Foreman

Full Tilt

"Full Tilt" tells the story of the amazing Ray/Tracey and her perilous high-speed journey to the Electronic Theater. Braving traffic, skyscrapers, and a trigger-happy Heli-Cop-Ter, Tracey has less than two minutes to race her Hover-Vette to the film event of the year!

This is Station X Entertainment Inc.'s second in-house film short this year. A small team of artists created this full 3D adventure featuring a unique merging of photo-realistic rendering with stylized design.

Written and directed by
Aristomenis Tsirbas

VFX Supervisors
Danny Braet

CG Supervisor
Enrique Munoz

Producer
Anne Miller

Contributing Artists
Scott Cegielski
Alan Chan
Karl Denham
Jeff Dierstein
Robert Glaser
Kent Lidke
Luke McDonald
Richard Morton
Dickie Payne
Alan Precourt
Denis Samoilov
Greg Teegarden
Grant Viklund
Don Waller

Digital Production
Ben Breakstone
Les Jones

Head Of Technology
Hector Barrera

Software Development
Mitch Middler

Executive Producer
Jennifer Bergman

A Station X Entertainment, Inc. Production

With the motifs of “multiplication,” “self-fertilization,” and “birth,” this piece of artwork is the expression of Sadamune Takenaka’s world of art. Although these three concepts have a rather grotesque nature when expressed in images, this project is original in trying to create a clean and clear impression.

The tools used in creating this artwork were SGI O2, Alias|Wavefront PowerAnimator, Maya, and Composer, Infinity by Quantel, and Inferno by Discreet.

Sadamune Takenaka
Omnibus Japan Inc.
takenaka@omni.co.jp

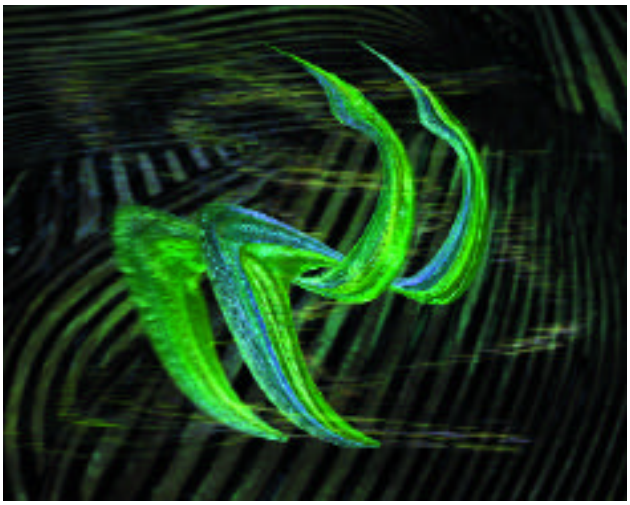
Director
Sadamune Takenaka

Producer
Yoshifumi Sadahara

Contributors
Gentaro Yamamoto, Kenji Sakoda, Yasuo Koga, Shingo Sato, Shunichiro Tsumori, Rokurota Shimizu, Mayumi Senoue

#4 – The Driven Key

Animation to music. A study in mirrored symmetry



Dan Bailey
University of Maryland Baltimore County
bailey@umbc.edu

Director
Dan Bailey

Producer
Dan Bailey

Contributors
Imaging Research Center, UMBC

Accords Perdus

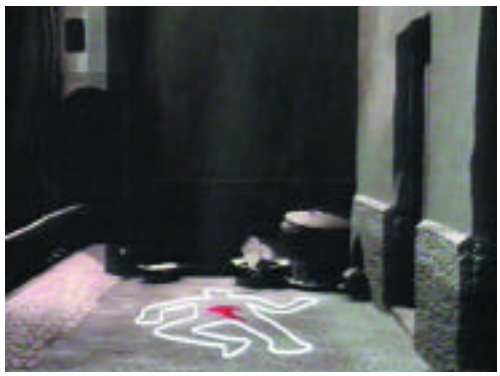
A town, the night, a man is dying.

Bruno Follet
Heure Exquise! Distribution
exquise@nordnet.fr

Director
Joachim Luxo

Producer
ENSAD Aii

Contributors
Joachim Luxo



Akira Kurosawa's Flying

This story comes from a series of stories by Akira Kurosawa, "Dreams I have Had," which was published about 10 years ago. This is a digitally visualized version. Akihabara-originated Windows NTmachines and 3D Studio MAX enable us to realize our passion: continuous respect to Kurosawa.

Kyoko Denda
motor/liez
lempicka@cf6.so-net.ne.jp

Director
Shinji Higuchi

Producer
Hisao Kurosawa

Contributors
Image corporation, motor/liez

Alaris

As they collect samples of life on Earth, two aliens get confused by the new train between Madrid and Valencia and mistake the train for their own spacecraft.

This work was accomplished with Softimage, Maya, and Alias software, plus a proprietary software that enhances characters' responses to light.

Compositing was done on Henry and Flame.

Juan Tomicic
Daiquiri
spainbox@retemail.es

Director
Victor Garcia

Producers
Daiquiri Digital Pictures, Lee Films

Contributors
Spainbox

Alternative Way of Life

"Alternative Way of Life," a futurist commercial, is a medicine lab selling drugs. This movie is the new commercial campaign for the products. I used a 3DS max, Adobe After Effects, and Beta video.

Yann Bassani
Art School Of Poitiers
y_bassani@yahoo.fr

Director
Yann Bassani

Producer
E.S.I Poitiers

AMFM: First MTV

AMFM are twins whose record was released in May 2000 in Hong Kong and throughout China. They are not just virtual idols. They will also make their own movies

Software: Maya and proprietary facial expression and lips-sync system. Hardware: Pentium III customized computer.

www.amfm.com.hk

Victor Wong
Menfond Electronic Art/Film Workshop/Hype Records
menfond@hk.super.net

Director
Eddy Wong

Producers
Nansun Shi, Tsui Hark

Contributors
Ken Lim, Hype Records PTE Ltd.

Autumn Bamboo

An animated Chinese ink brush painting. The style was achieved by applying procedural shaders on 3D models.

Ching Clara Chan
Texas A&M University
clara@viz.tamu.edu

Director
Ching Clara Chan

Music
Thomas Moore

Avenue Amy

"Avenue Amy" follows the life of a downtown girl as she searches for love in New York City's East Village. Actors were shot on green-screen sets and digitally fed directly into a computer. On-set digital artists worked in concert with the live-action crew to create a stylized look. They had to ensure that the characters felt like they were in actual environments and that all the nuances of the performance would come through in the final animation. During their performance, the actors were able to see themselves in photo-real virtual 3D environments created from photographs of current Village locations. After the shoot, traditional cel animators digitally added more detail to the rendered characters, which were then composited into cel-shaded environments with touches of lighting, depth, and realism.

Boo Wong
Curious Pictures
boo@curiouspictures.com

Created by
Amy Sohn & Joan Raspo

Designed and Directed by
Joan Raspo

Written by and starring
Amy Sohn

Produced by
Sally Norvell

Production Manager
Phil Higgs

Visual Effects Supervisor
Lewis Kofsky

Digital Artists
Jeeyun Sung
Birgit Rathsmann
Vanessa vanderBaan
Grace Liu
Marcos Y. Zevallos

Director of Photography
Toshi Ozawa

Editor
Steve Hamilton

Produced by Curious Pictures for Oxygen Network

BAA 2000

Ident sequence for The British Animation Awards (BAA), depicting the deification of a scarecrow in the 2.5D world of curious sheep.

Software: Maya, RenderMan, Photoshop. Hardware: SGI Octane.

Robin Shaw
The Moving Picture Company
robin-s@moving-picture.co.uk

Director
Robin Shaw

Producer
Asher Rees-Edwards

Lead Animator
Lars Johansson

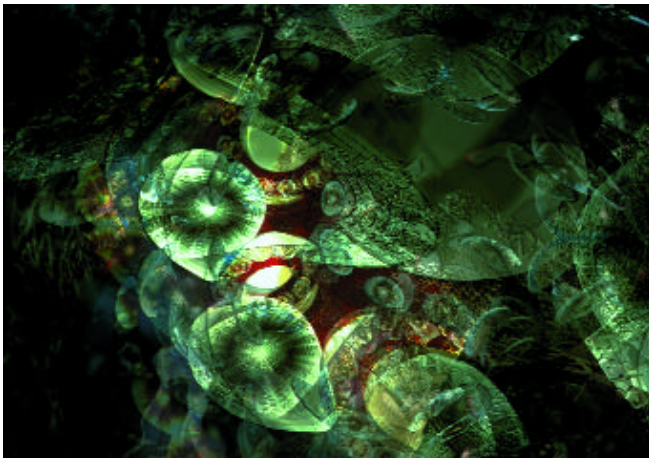
Animators
Mathias Larserud, Russell Appleford

Compositors/Editors
Christophe Richard, Alex Lovejoy

Composer
Oliver Davis (We Write Music Ltd.)

Sound Designer
Russell Pay

Believer



Mimi Goese's record was completed, and I sought to create a music-video for her song "Believer." Because the video had to be done quickly for promotional purposes, I devised a minimal piece based on animation sketches created in real time using the mouse (to drive Softimage animation channels) as a semi-dance-partner while the song played. These sketches contained the song-sync, lighting, movement, scaling, and dynamic information that I needed. I meticulously tweaked these spontaneous dance sketches into something more precise. Then information was copied, referenced, and reworked to create lip-sync and complexity, while retaining the dance spontaneity from the channel information.

James Ellis
Secret Sauce
jim@emsh.calarts.edu

Director
James Ellis

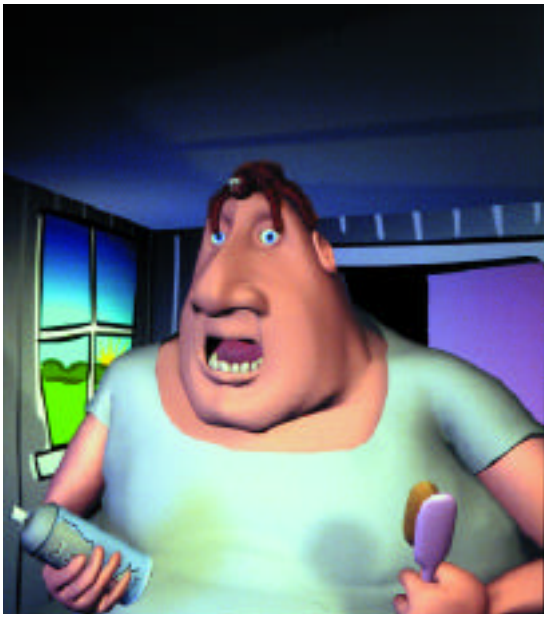
Producer
Secret Sauce

Music
Mimi

Inspiration
Dwight Rider

A Secret Sauce production

Big Hairy Spider



"Big Hairy Spider" deals with a fat man's narcissism and eventual realization that life's challenges can be perceived as benefits.

Bradley Bowling
Ringling School of Art and Design
bbowling@ringling.edu

Director
Bradley Bowling

Producer
Ringling School of Art and Design

Contributors
God, my family, Shannon, Dallas, and Tristan

Block Wars

"Block Wars" is a response to SIGGRAPH 2000's asking the computer graphics community for more independent Computer Animation Festival submissions. Created for SIGGRAPH 2000 only, this is intended as a humorous spoof of a classic scene from "Star Wars." I did everything myself, independent of Rhythm & Hues.

Final: 35mm. Modeling in Power Animator. Animation and rendering in Maya.

Robert Rioux
riouxr@pacbell.net

Director
Robert Rioux

Producer
Robert Rioux

Calling

This work was composed with 3D CG and a scanned photograph, which were processed as follows:

- 3D CG materials. A Photoshop filter was applied frame by frame. Then the filtering process was repeated to express not only texture changing, but also subtle particle blurring in the sequence.
- Scanned photograph taken with an original pinhole camera. This technique enables a soft glow that attenuates from the center to the edge of the picture.

The image and the soundscape were linked together to create a fantastic poetic taste of Japanese beauty.

Tomoya Naruse
Tokyo Zokei University
na8749@bd.mbn.or.jp

Director
Tomoya Naruse

Producer
Tomoya Naruse

Contributors
Iwao Haruguchi

Cat Ciao

What happens when your eyes are bigger than your mouth? Or more importantly, your brain? This profound question is what "Cat Ciao" attempts to explore and resolve. Unbeknownst to most of us, this gastronomical human flaw exists in the animal kingdom as well. In a Darwinian tale of the survival of the fittest, "Cat Ciao" demonstrates that the aggressor doesn't necessarily always win, especially when feline curiosity and insatiability are involved.

Sam Chen
Pixel Playground Animations
sambochen@yahoo.com

Director
Sam Chen

Producer
Sam Chen

Music
Ed Allard, Christina Ahn

Story, direction, animation, editing, producing, sound, design
Sam Chen

"Cat Ciao" was produced over a period of about six months by a relatively small team. The eventual goal was to create a fun and entertaining story with memorable characters that are full of personality. The animation was produced entirely with AliasIWave front Maya software running on SGI and NTsystems. Editing and assembly were performed in Adobe Premiere. No animals were harmed in the production of this film.

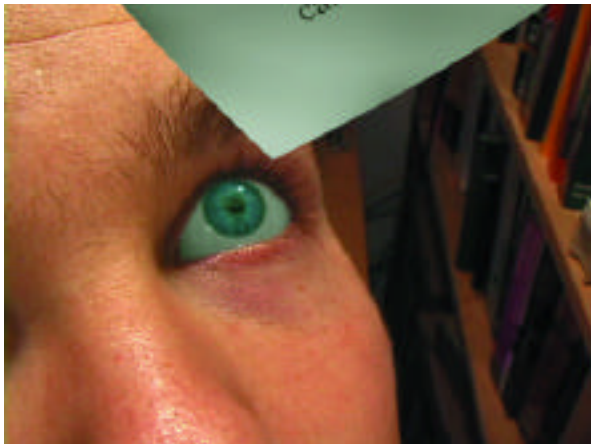
CG-Eye

This mocudramedy is an interview with Matt, the first recipient of digital eye replacement surgery. We learn how Matt lost his eye, where he found the digital surgeon, and what his new eye can now do.

Matt Rhodes
matt@motivatedpixels.com

Director
Matt Rhodes

Producer
Matt Rhodes



The Chemical Brothers: Let Forever Be

This music video was created in honor of the 1970s (kaleidoscope and mosaic effects) using camera effects rather than post effects. The video was shot using two different media, video for the real world and 35mm for the effects that needed to be created in post-production. The challenge was in matching film and video and creating in-between frames on images that were completely different. Starting with one talent, our challenge was to multiply the talent, or starting with multiple talents, to end with just one.

Software: In-house software, Elastic Reality, T-morph, Softimage, Mental Ray.

Pierre Buffin
Buf Compagnie
contact@buf.fr

Director
Michel Gondry

Producer
Partizan Midi Minuit

Contributors
Buf Compagnie

Citibank "Bunnies"

This commercial features origami dollar bill bunnies. It was created with Maya on SGIs.

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LuAnn Graver
Will Vinton Studios
luann@vinton.com

Director
Skeets McGrew

Producer
Leslie O'Connor

Contributors
Will Vinton Studios

CNP "L'arbre"

This commercial is a one-shot sequence. It gives a feeling of continuity, but, in reality, it conceals a very complex shooting, a lot of vfx, and major post-production work. Software: Inferno/Softimage. Hardware: SGI. Techniques: CG/digital matte painting/compositing.

Annie Dautane
Medialab Pictures
annie@medialab.fr

Director
Bruno Aveillan

Producer
François Brun

Agency
Louis XIV

Production
Quad Productions

Post Production Producer
Baptiste Andrieux

Post Production
Medialab Pictures

Shooting Supervisor
Philippe Reinaudo

Compositing Graphic Artists
Bruno Maillard, François Dumoulin

CG Supervisor
Luc Froehlicher

CG Artists
Emmanul Chapon, Pierre Pilard

Digital Matte Painting
Alain Duval

Visual Effects Producer
Annie Dautane

Post Production Manager
Pascale Mazoyer

coinlaundry XYZ

After midnight, a group of three weird-looking people (characterized as X, Y, and Z axes) are swimming across a launderette. They love the place very much and play around as they please. The director has received many awards in the fields of computer graphics and film for designing characters and creating unique worlds.

Hardware: IBM Intellistation, SGI 320. Software: Lightwave 3D 5.6, Adobe Photoshop 5.5, Adobe After Effects 4.0, Logic Audio 3.0, Acid.

Satoshi Tomioka
D's Garage 21
dsgarage21@tv-asahi-music.co.jp

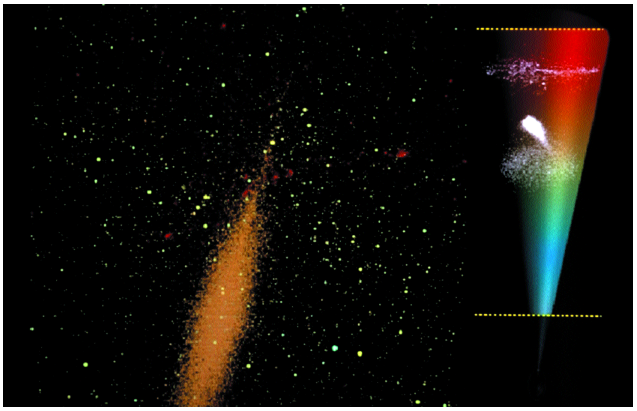
Director
Satoshi Tomioka

Producer
Yuichi Takahashi

Contributors
Hiroaki Ichikawa, Takahiro Hisanaga, Masaru Nagao, Bob Matsuhira, Satoshi Tomioka, and Play Divers.

Cosmic Clock

On Earth, we see the night sky as a single image filled with points of light. Yet each beam of light that reaches our eyes has a different history. This animation depicts the fantastic story of these traveling light rays as they reveal snapshots of the cosmos reaching back toward the beginning of time itself.



Andrew J. Hanson
Indiana University
hansona@indiana.edu

Director
Andrew J. Hanson

Producer
Andrew J. Hanson

Animator
Philip C. W. Fu

Post production
David Rust

In a mass-consumption society, various things, and even the existence of things themselves, are easily consumed and dumped. Furthermore, through cloning, the existential value of life is being lost. The purpose of this story is to urge people to reexamine and recover the value of life, which should be a top priority. To make this theme easy to understand, the characters are designed as simple as possible.

Tomoyuki Yonishi
Digital Hollywood
madhouse@os.usen.ne.jp

Director
Tomoyuki Yomishi

Producer
Tomoyuki Yonishi

CROCOTIRES: traction AAA

When night falls in a vast garbage dump full of discarded tires, a different world emerges. The tires take shape, come alive, and spar with one another.

This short film attempts to raise CG to a higher level of hyperreality.

Shuzo Shiota
Polygon Pictures Inc.
shuzo@ppi.co.jp

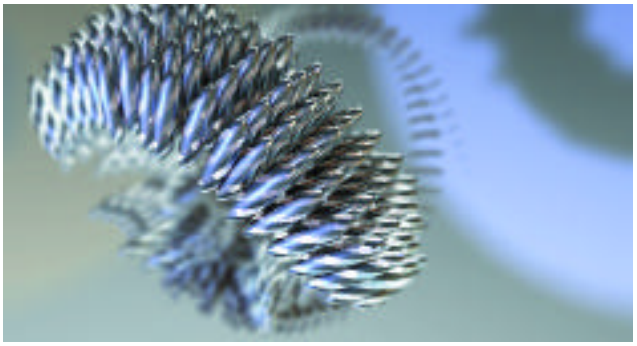
Director
Tohru '"Patrick"' Awa

Executive Producer
Toshifumi Kawahara

Producers
Chihiro Sato, Shuzo Shiota

Cycle

The objects in this film are a metaphor for people who live and work in the Tokyo area. These people are extremely busy, due to daily tedious, exhausting tasks. A sudden explosion sets them free for awhile, but succeeding days are as oppressive as ever.



Nobuo Takahashi
Namco Limited
nobuo@vs.namco.co.jp

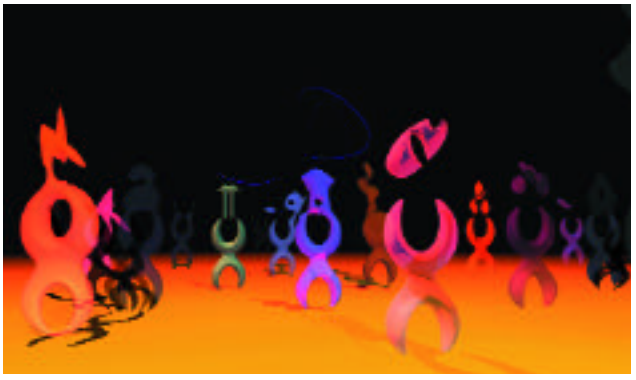
Director
Nobuo Takahashi

Producer
Nobuo Takahashi

Dedale Ascetique Aux Frasques Louanges

The object has something to say to us. It takes us back in time. A rift opens up, enabling us to enter a dream.

Hardware: 3D computer.



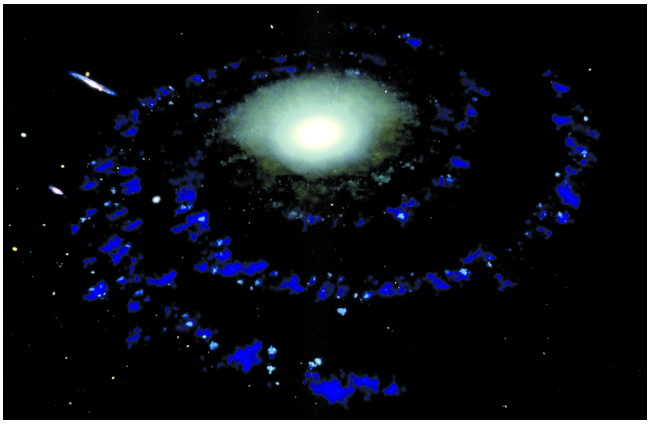
Nicolas Billiotel
Centre National de la Bande Dessinée et de l'Image
din@cnbdi.fr

Director
Nicolas Billiotel

Producer
Centre National de la Bande Dessin e et de l'Image

Music
Eric Caillerez

Digital Galaxy Project



This video is an excerpt from the inaugural show at the new Hayden Planetarium in New York City. It depicts only a portion of the full 21-meter digital-dome projection. We begin with the real-time-rendered Milky Way, pulling out to reveal its neighboring pre-rendered galaxies as outlying members of the Virgo Supercluster, the densest group in the filament that dominates this view drawn from Brent Tully's 3D catalog of 30,000 nearby galaxies. For still larger scales, we switch to Ostriker and Bode's gigaparsec dark-matter simulation, which shows the universe as a foam of condensed filaments and knots surrounded by vast voids.

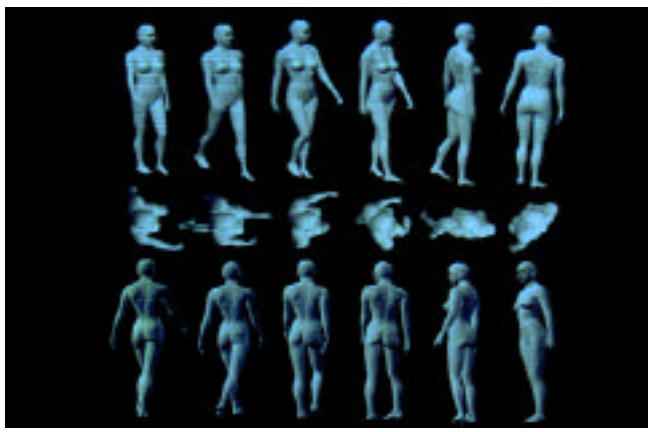
Erik Wesselak
American Museum of Natural History
erik@amnh.org

Directors
Donna Cox, Dennis Davidson

Producer
American Museum of Natural History

Contributors
Space Show Production, National Center for Supercomputing Applications: Donna Cox, Stuart Levy, Robert Patterson, American Museum of Natural History, Dennis Davidson, Carter Emmart, Erik Wesselak, Batwin+Robin Productions, Michael Hoeschen, Robin Sylvestri, Science Data: Digital Galaxy Project, University of Hawaii, Brent Tully, Princeton University: Jerimiah Ostriker, Paul Bode. Real-Time Simulation Software: Aechelon Technology

Digital Muybridge: The Human Figures of Japan



Muybridge recorded motion of humans and animals in multiple photographs. These chrono-photographs are valuable works not only as a photo album, but also as a human database.

"The Human Figures of Japan" is based on ergonomic somatometry data of 25 Japanese men and women. These virtual human figures are synthesized by 3D digitizing data, motion-capture data, and multiple-angle photograph and video data. This human nude-figure database will be adapted to many fields of design work.

Etsuo Genda
Kyushu Institute of Design
genda@kyushu-id.ac.jp

Director
Etsuo Genda

Producer
Hiroshi Arita

Contributors
Kyushu Institute of Design Genda Laboratory
General Asahi Co., Ltd

Dimension

Life presents a puzzle for us everyday. As soon as one obstacle is overcome, another takes its place. It is what one makes out of these confinements that makes a person feel free, no matter what they are.

George Schermer
Ringling School of Art and Design
gscherme@ringling.edu

Director
George Schermer

Producer
Ringling School of Art and Design

Contributors
Jim McCampbell, Bob Melville, Ed Cheetham, Phil Chiocchio, Claudia Cumbie-Jones, Julie Goldstien, Karen Sullivan, Ed Gavin, Steve Miller, Jeff Boddy, and Amber Rudolph

Dodge "Molecule"

Dodge elevates its "Different" campaign to a new level of excellence with the dynamic "Molecule" spot, in which transitions constitute the main attraction, after the vehicles, of course. This 60-second spot features the entire Dodge lineup in brilliant Dodge Red. We travel into a molecular world composed of Intrepids, Durangos, Neons, and more, where metal is liquid and the only constant form is evolution.

Yves Metraux
Industrial Light + Magic
yves@ilm.com

Director
Steve Beck

Producer
Joel Zimmerman

Post Producer
Kip Larsen

Post Production Supervisor
Lori Crover

CG Supervisor
Sandy Karpman

Modeler
Neil Lim Sang

Animatic Artist
Kirk McInroy

Lead Flame Artist
Orin Green

Compositors
Okan Ataman, Wendy Bell, Carole Johnson, Ladd McPartland

Technical Directors
Branko Grujcic, Marie-Laure Laffitte, Marc Cooper, Morris May, Terrance Masson

Assistant Technical Director
Cedrick Chan

Editor
Nick Seuser

Video Technical Assistants
Lee Djokovic, Grace Lan, Scott Younkin

Executive Producer/Division Manager
Marcie Malooly

Director Digital Creatures/CGC
Ken Maruyama

Head of Commercial Production
Paul Grimshaw

Head of CG Commercials
John R.A. Benson

Commercial Editorial Manager
Mark Tellegen

CGC Production Manager
Danielle Dubay

CGC Project Manager
Luke O'Byrne

CGC Production Assistant
David Mammola

Dongri

One summer day, a beetle encounters a strange acorn, the Dongri, in the woods.

Sho Hasegawa
Keio University Inakage Lab
inakage@sfc.keio.ac.jp

Director
Sho Hasegawa

Producer
Sho Hasegawa

Contributor
Sho Hasegawa

DUKE2000.com

Doonesbury's legendary Duke is on the run — for President of the United States. The only real cartoon character to throw his hat into the presidential ring this year, Duke will make history with his bid for the Reform Party nomination, assuming he doesn't change his mind. This campaign for president by Duke is the first transmedia production of its kind: A Web-centric media event that thrives through an orchestration of Web, print, radio, and television guerrilla attacks (live and otherwise). DUKE2000.com is constantly adapting to and influencing events surrounding the impending presidential election through the year 2000.

Brad deGraf
DotComix (aka Protozoa)
brad@protozoa.com

Director
Garry Trudeau

Producers
Buzz Hays
Ann Brilz

DUKE2000 Campaign Crew
Garry Trudeau

Creator
Fred Newman

Voice/Body Performer/Writer
David Stanford

Writers
Dan Sterling
Buzz Hays

Executive Producer
Marc Scaparro

Head of Production
Eric Gregory

Head of Engineering
Brad deGraf

Strategic Advisor
Mike Palmieri

Animation Director
Todd Pound

Art Director
Dan Hanna

Puppeteer
Ann Brilz

Producer
Dave Van Dyke

Coordinator
Noah Landis

Audio Engineer
John Turner

Stage Manager
Kimberly Walton

Wrangler
Koala Moore

Elevator World

"Elevator World" is an essay on the spatial politics of elevator riding, proffering a world in which aesthetics serve as sanctuary to both the down-trodden and the upwardly mobile. Conceptually rich and visually whimsical, it is a wry observation on postmodern life. Created on a Mac using After Effects and Poser for virtually no budget, "Elevator World" recently won the Grand Prize for Best Short at Slamdance.

Mitchell Rose
entheos@flash.net

Director
Mitchell Rose

Producer
Mitchell Rose

Writer
Mitchell Rose

Animator
Mitchell Rose

Music
Ross Levinson

EPS Process and Applications Video

Three years ago, IOMEDIA created a simple animation for EPS to demonstrate their proprietary rubber-recycling process to potential investors, who might contribute funds to construct their first facility. The original video was so successful that EPS came back to IOMEDIA this year to request a new, updated video. Based on photographs, video, and a trip to the original facility, IOMEDIA recreated the entire process using Softimage 3D. X-ray passes were used to show the functionality of the machines. Depth of field was added using After Effects. In all, eight separate animation passes were composited together using Softimage DS.

Maria Spinella
IOMEDIA
maria@io-media.com

Director
Peter Korian

Producers
Christopher Batty, Maria Spinella

Contributors
Moneta Ho, Ildar Istarki, Steve Korian, Ben Kou, Marc Lafontant, Mike Lasker, Nobu Nakaguchi, Carla Pickering, Ben Pirt, Eric Rosemann, Damijan Saccio, Steven Wood, Cindy Yang, Peipei Yuan

evil I

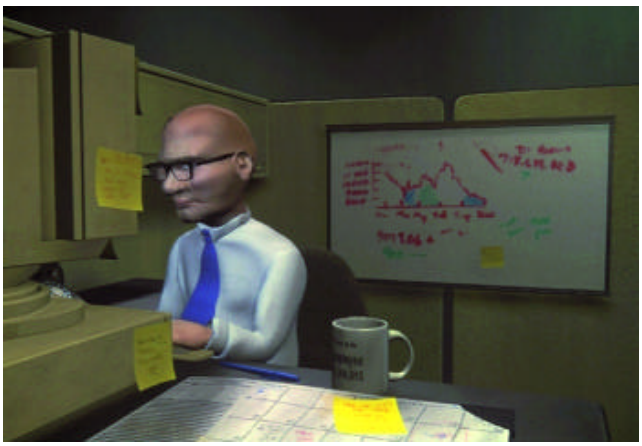
"evil I" is a commentary on the role of surveillance in today's workplace. The film centers around Burton Price, an average cubicle-confined employee. The plot thickens when Burton attempts to break out of his assigned space. Unfortunately, the evil boss is watching. The animation was done with Maya 2.5 and Alias Studio 9. It was produced for a masters degree at the Rochester Institute of Technology.

Jason Donati
Rochester Institute of Technology
jdonati@animationtech.com

Director
Jason Donati

Producer
Jason Donati

Music
Chris Cryan



EYEball

This on-screen ident for cinema at The Moving Picture Company aims to hit the eightball right between thy eye... Storyline: Always keep thy eye on the ball ... in thy eye. FrankenMixedMediaExtravaganza of live action and CGI.

Software: Maya, Alias|Wavefront, Matador. Hardware: SGI Octane. Live action shot with Digicam.

Lars Magnus Holmgren (a.ka. Dr. Frankenskippy)
The Moving Picture Company
frankenskippy@moving-picture.co.uk

Director
Lars Magnus Holmgren

Executive Producer
Dominic Buttimore

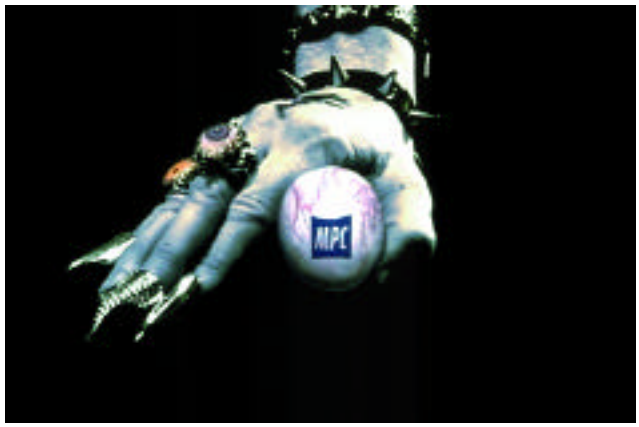
Producer/styling
Claire Waxler

Camera/lighting
Chas Jarrett

Compositor/Editor
Alex Lovejoy

Sound design
Oliver Davis (We Write Music)

Props
The Great Frog



Faux Plafond — Cosmic Promenade

A full moon night. A couple who can not sleep seeks domestic distraction and discovers a fantastic journey under the vault of stars.
Workstation: Macintosh

Maryle Capmas
Mikros Image
maryle.capmas@mikrosimage.fr

Director
François Vogel

Producer
Mikros Image

Post-Production
Mikros Image

Image Operator
Pascal Laurent

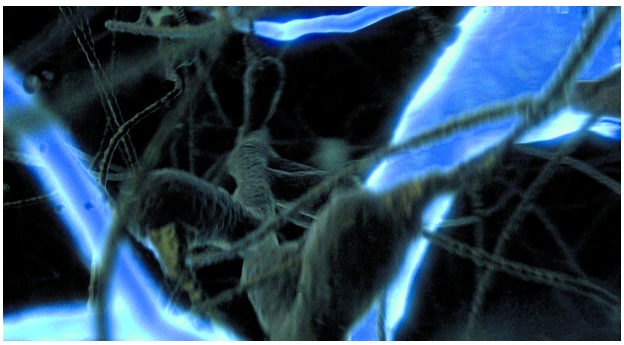
Music
J r me Coulet

Project Manager
Michel Bult

Digital Artists
Francois Vogel
Anna Paula Pizzocaro

FIGHT CLUB — Brain Fly-Through

Hailed as one of the great visual effect sequences of the year, Digital Domain's "Brain Fly-Through" sequence takes the audience, in one single 95-second shot of 2,256 frames, through a human brain from the inception of a spark-like synapse in a dendrite forest, into the convolutions of grey matter, through cranial bone, up a hair follicle and down a CG-generated face of actor Edward Norton. Created entirely in CG, the shot combines Digital Domain's procedural approach in Houdini with its L Systems approach featured in "What Dreams May Come."



Bob Hoffman
Digital Domain, Inc.
bhoffman@d2.com

Visual Effects Supervisor
Kevin Mack

Visual Effects Producer
Eileen Moran

Computer Graphics Supervisor
Matthew Butler

Digital Compositing Supervisor
Carey Villegas

Visual Effects Coordinator
Lauren Littleton

Opening Sequence Team Leads
David W. Prescott, Judith Crow

Digital Compositors
Darren M. Poe, Rachael Dunn, David Stern

Digital Artists
Daniel Lemmon, Sean Andrew Fadden, Vernon R. Wilbert, Jr., Brad Parker, Michael Edland, Zachary Tucker, Chris Y. Yang

Digital Paint Artists
Paolo J. De Guzman, Martha Snow Mack

Software Engineers
Darin K. Grant, Lucio I. Flores

Imaging Supervisor
Michael D. Kanfer

Vfx Production Executive
Nancy Bernstein

Director
David Fincher

Producer
Cean Chaffin

Production Vfx Supervisor
Kevin Haug

Film VR

Film VR follows a day in the life of a secret agent. It was created using Softimage 3D v3.5 on SGI O2s at the School of the Art Institute of Chicago.

James Campbell
Blue Sky Studios
jamesc@blueskystudios.com

Director
James Campbell

Producer
James Campbell

Music and sound
Matthew Akers

Music
David Suycott

Firelight: Graphics and Archaeology

The parietal art at the Cap Blanc cave site in France is a remarkable record of the earliest representational artistic expression. However, these carvings and paintings are often studied by archaeologists using modern light sources, such as floodlights, rather than firelight. The aim of this research is to examine the art accurately under the dynamic illumination provided by reconstructions of ancient firelight, without the need to take burning torches into these fragile sites. We used laser-scanned data rendered using the Radiance lighting visualisation system to create this animation.

Alan Chalmers
University of Bristol, UK
alan@cs.bris.ac.uk

Contributors
Alan Chalmers, Chris Green, Michael Hall

Fixture Fixation

I'm very intrigued by old objects, especially antiques from the late Victorian era. It's the look of the objects from that time, their romantic mood and ornate style, that make me wonder what type of personality they might possess.

Being resourceful to solve your problems may not work the way you hope.

Marc Stanyk
Ringling School of Art and Design c/o Susan Trovas
mstanyk@Ringling.edu

Director
Marc Stanyk

Producer
Ringling School of Art and Design

Contributors
All my family, the CA faculty, and my peers.

For the Birds

A flock of small birds resting on a telephone wire is interrupted when a larger bird tries to join them. His high-wire balancing act disturbs the flock until they decide to remove him. Animated with Pixar's proprietary animation software, RenderMan, and Subdivision Surfaces modeling, "For the Birds" continues in the Pixar tradition of creating short films that explore the creative and technical possibilities of computer animation.

Karen Dufilho
Pixar Animation Studios
karend@pixar.com

Director
Ralph Eggleston

Producer
Karen Dufilho

Contributors
Bill Wise, John Lasseter, Eben Ostby, James Ford Murphy

Galaxy Quest

ILM's computer graphics provided the only viable approach to bringing the rock monster to life. Formed from boulders scattered around the crystal planet and loosely held together by mysterious forces, the creature required a new approach to animation using a proprietary rigid body solver. Animated rock geometries were selectively freed into a dynamic simulation so they could not interpenetrate, but rather could form together from unconnected objects. Collisions between rocks drove emissions of CG dust and rock chips, while automatic ground interactions tied the creature into the scenes. Textures, lighting, and careful compositing to match the location completed the effect.

Yves Metraux
Industrial Light + Magic
yves@ilm.com

Visual Effects Supervisor
Bill George

Visual Effects Producer
Kim Bromley

ILM Animation Supervisor
Christopher Armstrong

Co-Visual Effects Supervisor
Ed Hirsh

Visual Effects Associate Supervisor
Ben Snow

Creative Advisor
Stefen Fangmeier

Visual Effects Associate Producer
Janet Lewin

Computer Graphics Supervisor
Dan Goldman

Compositing Supervisor
Marshall Krasser

Visual Effects Art Director
Alex Jaeger

Visual Effects Director of Photography
Patrick Sweeney

Practical Model Supervisor
Brian Gernand

Technical Animation Supervisor
James Tooley

Digital Creature Model Supervisor
Geoff Campbell

Digital Color Timing Supervisor
Kenneth Smith

Motion Control Camera Operator
Carl Miller

Motion Control First Assistant Camera
Mike Bienstock, Michale Hardwick, David Janssen

Motion Control Gaffer
Michael Olague

Stage Support
Dennis Gehringer, David Watson

Chief Model Makers
Barbara Affonso, Charlie Bailey, Carol Bauman, Don Bies, Fon Davis, John Duncan, Grant Imahara, Michael Lynch, Scott McNamara, Tony Preciado, Kim Smith, Steve Walton Model Makers - Bryan Dewe, Robert Edwards, Mark Fiorenza, David Fogler, Tim Gillett, Nelson Hall, Aaron Haye, Peggy Hrastar, Michael Jobe, Richard Miller, David Murphy, Ben Nichols, Alan Peterson, Thomas Proost, Christopher Reed, Mark Siegel, Daniel Wagner, Mark Walas

Computer Graphics Artists
Mimi Abers, Shadi Almassizadeh, Al Bailey, Kathleen Beeler, Aron Bonar, Patrick Brennan, Billy Brooks, Mario Capellari, Caitlin Content, Jay Cooper, David Deuber, Gonzalo Escudero, Raul Essig, Todd Fulford, Jim Hagedorn, Andrew Hardaway, David Hisanaga, Dorne Huebler, Polly Ing, Erich Ippen, Samson Kao, Hilmar Koch, Jonathan Litt, Craig Lyn, Stuart Maschwitz, Michael Min, David Parrish, Bruce Powell, Ricardo Ramos, Philippe Rebours, Massimiliano Rocchetti, Tom Rosseter, Douglas Sutton, Catherine Tate, Chad Taylor, Susan Weeks, Colie Wertz, Ken Ziegler, Rita Zimmerman

Animation Leads
Linda Bel, Scott Wirtz

Animators
Scott Benza, Andrew Doucette, Andrew Grant, Ken King, Victoria Livingstone, Mark Powers, David Sidley, Tom St.Amand, Kim Thompson

Lead Viewpaint Artist
Ron Woodall

Digital Modelers
Andrew Cawrse, Li-Hsien Wei

Enveloper
Lenny Lee

3D Camera Matchmove Supervisor
Michael Halsted

Location Matchmove Technician
Alia Agha

3D Matchmove Artists
Lanny Cermak, Wendy Hendrickson-Ellis, Jodie Maier, David Manos Morris, R.D. Wegener

Lead Digital Paint Artist
Katharine Baird

Digital Paint and Roto Artists
Chris Bayz, Scott David, Deborah Fought, Cameron Griffin, Jiri Jacknowitz, C. Andrew Nelson, Amy Shepard, Erin West

Digital Matte Artists
Ronn Brown, Jett, Ivo Horvat, Yusie Uesugi

Viewpaint Artist
Jean-Claude Langer

Visual Effects Coordinators
David Gray, Amanda Montgomery, Paula Nederman

Visual Concept Designers
John Goodson, Erich Rigling

Animatic Artists
James Smentowski, Christopher Stillman

Miniature Crash Director of Photography
Patrick Turner

Miniature Crash Stage Manager
David Dranitke

Lead Pyro Technician
Geoff Heron

First Assistant Camera
Paul Sanchez

Stage Support
Carl Assmus, William Barr, Rod Janusch, Daniel Michalske, Tim Morgan, Frank Tarantino

Miniature Crash Coordinator
Luke O'Byrne

Video playback
Clark Higgins

Visual Effects Production Assistants
Sacey Shear, Sam Stewart, Sam Granat

Visual Effects Editor
Tim Eaton

Visual Effects Assistant Editor
Carey Burens

Film Scanning Supervisor
Joshua Pines

Film Scanning Operators
Earl Beyer, George Gambetta

Negative Cutter
Doug Jones

Digital plate restoration
Maria Goodale, Katrina Stovold

Software development
David Benson, Alan Trombla

3D digitizing software
Marc Levoy, Brian Curless, Verhat Krishnamurthy

Technical support staff
Doug Applewhite, Michelle Motta, Ian McCamey, Blake Sweeney

Computer systems support
Erik Grieve

ILM Senior Staff
Patricia Blau, Gail Currey, Jeff Mann

Gatorade "Raptor"

Raptor vs. Raptor. Vince Carter, Toronto Raptor, vs. Velociraptor. Live-action human vs. computer-generated raptor. The challenge was to shoot the basketball player interacting with the creature. Carter was shot playing against a raptor stunt double who was then digitally removed and replaced with the completely CG raptor. Other challenges included water splashes and Gatorade flowing from the raptor's mouth.

Yves Metraux
Industrial Light + Magic
yves@ilm.com

Director
Steve Beck

Producer
Joel Zimmerman

Post Producer
Kip Larsen

Visual Effects Supervisor
Pablo Helman

Animation Director
Randy Dutra

Art Director
Erich Rigling

Post Production Supervisor
Michael Hogan

Lead Technical Director
Leandro Estebecorena

Technical Directors
Morris May
Tripp Brown
Marcus Stokes
Melva Young
Nigel Sumner
Jeremy Goldman
Kirk McInroy

Lead Animator
Dan Taylor

Animators
Ismail Acar
Michael Easton
Jonathan Lyons
Kirk McInroy
Tom St. Amand

Modelers
Ismail Acar
Neil Lim Sang

Enveloper
Rick Grandy

Viewpainter
Richard Moore

Roto/paint
Drew Klausner

Senior Flame Artist
Mark Casey

Compositors
Okan Ataman
Wendy Bell
Jennifer Gonzalez
Carole Johnson
Ladd McPartland
Kristen Millette

Lead Matchmover
Guy Hudson

Matchmovers
Peter Chesloff
Josh Lebeau

Software development
John Anderson
Vishwa Ranjan
Chris Horvath

Assistant TDs
Cedrick Chan
Todd Krish

Online Editor
Scott Younkin

Avid Effects Editor
Nick Seuser

Technical Assistant
Grace Lan

CG Resource Assistant
Mike Balog

Video Technical Assistant
Lee Djokovic

Executive Producer/Division Manager
Marcie Malooly

Director Digital Creatures/CGC
Ken Maruyama

Head of Commercial Productions
Paul Grimshaw

Head of CG Commercials
John RA Benson

Commercial Editorial Manager
Mark Tellegen

CGC Production Manager
Danielle Dubay

CGC Project Manager
Eric Schroeder

CGC Production Assistants
Dave Gottlieb
Dave Mammola

The Game Room

"The Game Room" is a 3D computer-animated demo for the first interactive syndicated Web broadcast show. The 3D animated characters review video games by interacting with them, and the host of the show interviews game characters in a talk show format. This short highlights the skills of this group of animators from Exodus Entertainment, as well as the original soundtrack, created by Douglas Thornton of Post Scores.

Director
Randy Gossman

Producer
Monty Clark

Executive Producer
Mark Brooks

Animators
Brett Baker, Devon Browne, Andy Angrand, Nick Schreiber, Jorge Verea, Reynaldo Acevedo

Music
Douglas Thornton

Sound design
Post Scores: Ashley Shepherd, Nick Sanders, Douglas Thornton

Geckos

It is mating season, and this young male has a lot to show for, especially his clumsiness!

Software: Softimage 3D 3.8, Softimage Eddie 3.5, and Photoshop 3.0.

Isabelle Marazzani
National Animation & Design Centre
isabella@nad.qc.ca

Director
Yanick Gaudreau

Producer
NAD Centre

Design, modeling, animations, and textures
Yanick Gaudreau

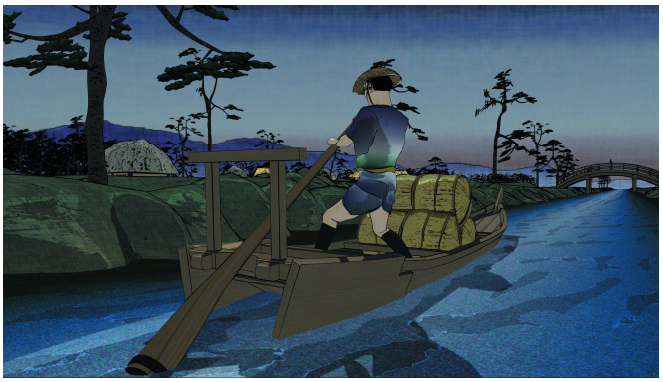
Music
Jean-Franiois William

Sound FX
Charles Meyer

Special thanks to Robin Tremblay and Nicolas Poteet

Geijutsuden

In this animation of the decoration truck game that arranged Japanese traditional art in the modern style, we used special techniques such as showing three dimensions as two dimensions and composing in traditional Japanese pictures.



Yukiko Kanatsuka
TYO Productions Inc.
yukoki@tyo.co.jp

Director/Animator
Junki Honma

Producer
Yusaku Toyoshima

Animators
Youichi Mouri, Kazue Kishino, Masayuki Abe, Hideaki Maegawa, Saiko Tada

3D Modelers
Kazuyuki Endo, Hiroshi Yagishita, Yukiko Nagai

Texture mapping
Jituhisa Shibata

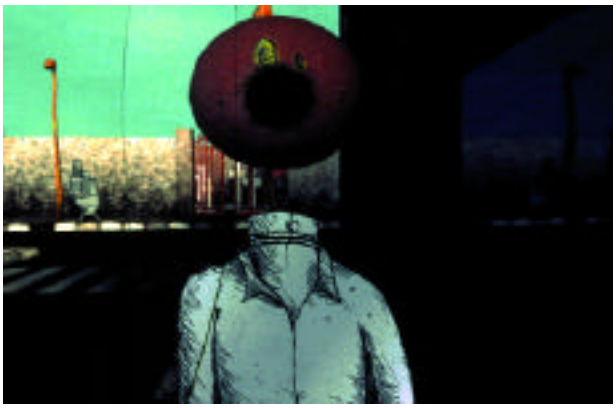
Sound Producer
Shigemitsu Goto

Sound Designers
Kenji Hikita, Ryoue Takagi

Office Administrator
Ai Kikuchi

Headless

A man loses his head and buys a red balloon instead of... Then he meets a sad little girl who wants the balloon, too. Rough pencil drawings, in combination with 3D animation, created with Softimage, give this short its special look.



Sven Pannicke
Filmakademie Baden-Württemberg
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Director
Wojtek Wawszczyk

Producer
Rima Schmidt

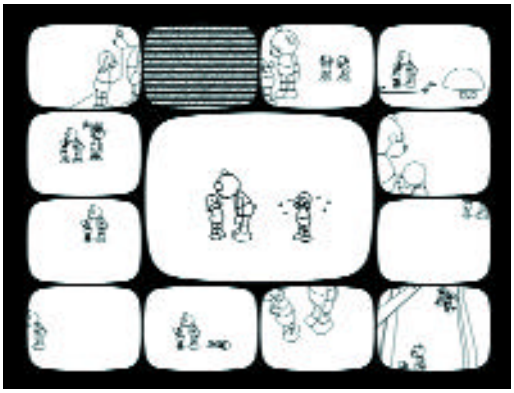
Music
Stephan Ziehten

Sound design
Ruediger Fleck

Second animation
Heidi Wittlinger

Heavy Rotation

Warning! The human who becomes the bear man has increased rapidly. The bear man practices brainwashing, since small children are converted to the bear man, and the bear man is successively numbered wheat gluten cakes. Apparently, the bear man is normal. Software: Softimage. Hardware:SGI O2.



Masaaki Taira
TRILOGY Corporation
taira@trilogy.co.jp

Director
Akio Watari
TRILOGY Corporation

Producer
Masaaki Taira
TRILOGY Corporation

Sound
ATOMIC RED

Hello, Dolly!

"Hello, Dolly!" is a satirical story about cloning. It begins one night as an insomniac tries to fall asleep by counting sheep. But he can't get past sheep #1.

This work was created entirely on SGI machines with Softimage as the main software for animation and modeling. Composer and Pandemonium were used for editing, compositing, and some visual effects. Sound was put together in ProTool on a Mac.

Mariko Hoshi
marikoholics@yahoo.com

Director
Mariko Hoshi

Animation, story, and modeling
Mariko Hoshi

Music
Carlos Baena

Sound Edit
Atsuko Yamagishi

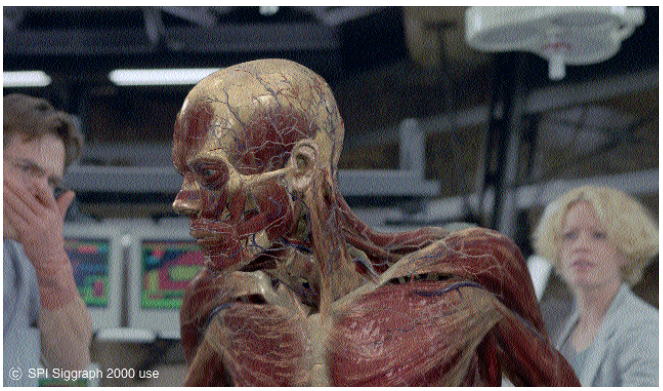
Sound Design
Mariko Hoshi, Atsuko Yamagishi

Voice
Fred Cabral

Advisors
Kevin Cain, Kyle Clark, Jimmy Hayward, Oren Jacob, Valerie Mih, Vanessa Schwartz

Hollow Man: Digital Human Project

Research and development for the Paul Verhoeven film "Hollow Man" required a thorough understanding of the human body. The result is a full-motion, stunningly realistic human model. This piece shows the build up of the various model layers, followed by tests of how the physiquing was applied to the models, and animation and look tests.



Don Levy
Sony Pictures Imageworks
don_levy@spe.sony.com

Director
Scott E. Anderson

Producers
Susan MacLeod, Brian Keeney

Contributors
Ken Hahn, Wayne Kennedy, Michael Hobbs, Thomas Hollier, Jeremy Cantor, Bruce Navsky

Hollywood

The Statue of Liberty comes to life after tasting a Hollywood chewing gum. She is walking down Manhattan streets, undressing little by little until she skinny dips under the Brooklyn Bridge. Modeling and animation of the Statue of Liberty in 3D. Compositing and integration in nine shots, including two aquatic shots. Underwear in 3D in two shots.

Software: Mental Ray, in-house software, Flame.

Pierre Buffin
Buf Compagnie
contact@buf.fr

Director
Didier and Thierry Poiraud

Producer
Entropie

Contributors
Buf Compagnie, Euro Rscg Paris

Hot Spot

In a club with a pounding 1980s disco beat, Ray and his friend Dave attempt to out-do each other on the dance floor, competing for the attention of the elegant Imogen. “Hot Spot” was produced with Softimage software on a dual Pentium III 600 MHZ computer.

Joanna Stevens
Passion Pictures
joanna@passion-pictures.com

Director
Mark Brierley

Producer
Andrew Ruhemann

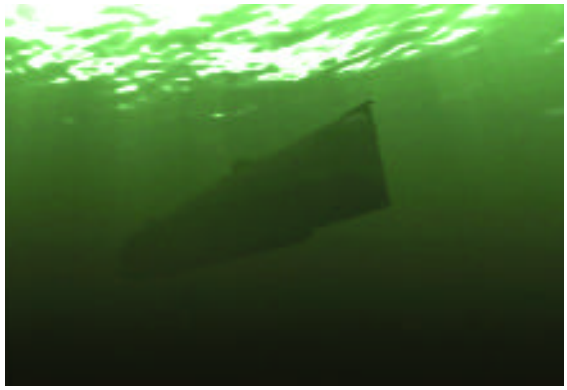
Editors
Stuart Hutcheson, Kevan O’Brien

Music
Mark Brierley

Produced in association with Aardman Animations

The Hunley

The images in this sequence are 100-percent CGI. The CG models of the Hunley submarine and the Housatonic sailing ship were built, textured, and lit in Lightwave. Volumetric lights, particles, and Z-depth renders were used to create a definitive look for the underwater scene. The final sequence involves the Hunley ramming the Housatonic with an explosive charge, which generates a 100-percent digital explosion. Lightwave’s Hypervoxels software was used to generate the explosion cloud, and a combination of particle systems and good-old-fashioned keyframing was used to portray the destruction of the Housatonic.



Grant Viklund
Station X Studios
viklund@stationxstudios.com

Director
John Gray

Producers
Eileen O’Connor
Darcy Leslie (For Station X)

Contributors
Staff of Station X

Hypokeimenon

"Dual Heads," a weird creature with two faces, one beautiful and the other ugly, lives beneath the subway platform. Tonight, as usual, the creature appears at an underground shopping mall looking for fresh blood from homeless people sleeping in cardboard beds. Alerted by an alarm, "Video Army Android" thrusts a video camera and monitor in front of the creature. Astonished and shocked by what it sees, the "face of beauty" dies. She wasn't aware of her ugly opposite face. Because it is unable to move, the ugly face also dies.

Hiroyasu Shimo
Kobe Design University
Shimo-h@kobe-du.ac.jp

Director
Hiroyasu Shimo

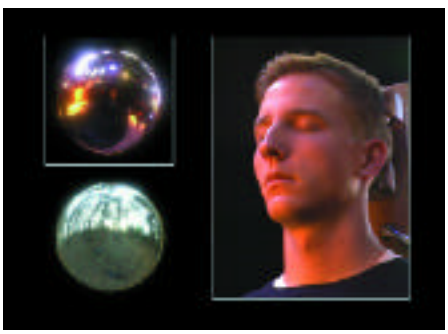
Producer
Hiroyasu Shimo

Editor
Yuichiro Ito

Music
Nobuo Shikata

Image-Based Lighting

"Image-Based Lighting" allows us to illuminate computer-rendered objects with light captured in the real world. Originally applied to synthetic objects, it has been extended to real objects as part of the SIGGRAPH 2000 paper: Acquiring the Reflectance Field of a Human Face. In this technique, a device called a light stage photographs the subject under illumination from all possible directions, and these images are efficiently recombined to accurately render the subject's appearance in any form of natural or synthetic illumination. These techniques can greatly facilitate realistic integration of live action and computer-generated imagery. See www.debevec.org for more information.



Paul Debevec
USC Institute for Creative Technologies
paul@debevec.org

Director
Paul Debevec

Producer
Paul Debevec

Contributors
Paul Debevec
Tim Hawkins
Chris Tchou
H.P. Duiker
Westley Sarokin

Imagination Sight

Hardware: Intel 500 MHz, Mac G3, ApplePerception, DPSBetacam SP/S ONY. Software: LightWave 3D, Newtek DigitalFusion, DPS Photoshop, Adobe.

Minoru Sasaki
Technonet Co., Ltd.
sasaki-m@technonet.co.jp

Director
Minoru Sasaki

Producer
Minoru Sasaki

Special FX & Technical Assistant
Shinichi Rembutsu

Composer and Sound Producer
Kazuhiro Ishikawa (TSP)

Sound effects
Kazuhiro Ishikawa (TSP), Hiroyuki (TSP), Kadowak (TSP)

Sound mix
Yutaka Hamada (TSP)

Contributors
Tuneo Saka
DSTORM Inc.

Inlex

Male love for the female initially stems from a love for our own mothers. She's the creator, the sea, the security of enclosure, depth, the color blue. And so there is a decision to be made by all who are tempted away from the security of the maternal sea and toward the lure of lust. It's been said that you can't have your cake and eat it, too. What are the consequences if you try?

Jeffrey James Boddy
Ringling School of Art & Design
jboddy@ringling.edu

Director
Jeffrey James Boddy

Producer
Ringling School of Art & Design

Music Composer
Jason Heinrich

Faculty Advisor
Jim McCampbell

Contributors
Claudia Cumbie-Jones, Bob Melville, George Schermer, Steve Miller

ISS Pro Evolution

In this PlayStation game intro, the focus is on one soccer player instead of many, and close-up views of four limbs instead of the entire player. Tight muscles and muddy shoes are portrayed in detail. Boys from all over symbolize the international adoration of soccer. Vivid background colors are used, for soccer is a bright and powerful environment. Members of the production team worked separately on the modeling, painting, and animation. To maintain consistency, one person was in charge of the storyboard, layout, lighting, rendering, and editing.

Aki Saito
Konami Co., Ltd
asaito@konami.co.jp

Director
Makoto Toyama

Producer
Makoto Toyama

Contributors
Murazo, Tsuguo Tadano, Naomi Hara, Akira Yamaoka

Jersey

A tender slice of the lives of two garbage men from New Jersey talking trash.

Joe Alter
Joseph Alter, Inc.
hipjoey@hotmail.com

Director
Joe Alter

Producer
Eric Redomski

Contributors
Joe Alter
Eric Redomski
John Brown
Grant Moran

Kigai

A woman has fallen asleep to a haunting dream. This piece recreates the appearance of a Japanese woodblock print. It adapts the aesthetic for both visual style and movement. The 3D set and characters were modeled and animated in Maya, and rendered using RenderMan via MTOR.

Amy Moran
Texas A&M Visualization Lab
amoran@viz.tamu.edu

Director
Amy Moran

Producer
Amy Moran

Contributors
Fred Parke, Mary Saslow, Karen Hillier-Woodfin

La Divine Inspiration

This is the Hae Jun Jhee version of the original screenplay and movie by Claus Drexel.

Bruno Follet
Heure Exquise! Distribution
exquise@nordnet.fr

Directors
Claus Drexel, Hae Jun Jhee

Producer
SUPINFOCOM, Drexel Films

Contributors
Claus Drexel, Hae Jun Jhee

La Hen

A hen can have everything she wants with a credit card.

Bruno Follet
Heure Exquise! Distribution
exquise@nordnet.fr

Directors
Bertrand Breuse, Olivier Feutry, Emmanuel Prevost

Producer
SUPINFOCOM

Contributors
Bertrand Breuse, Olivier Feutry, Emmanuel Prevost

The Last Drawing of Canaletto

This film is a 3D computer re-creation of an 18th-century drawing by the Venetian artist Canaletto. The viewer is able to enter the space of the 2D drawing and look around, while the moving light of the sun animates the otherwise motionless setting. An effort was made to combine the visual qualities of claymation, model photography, and time-lapse photography with the unique possibilities offered by computer animation.

www.cmza.com

Cameron McNall
University of California, Los Angeles
cmcnall@ucla.edu

Director
Cameron McNall

Filmmaker
Cameron McNall

Models
Shane Acker

Digitizing
Doren Garcia, Jim Gayed

Animation
David Hutchins

Editing
Gareth Smith

Clay Models
Jackie Stewart

Les Depossedes

A man and a woman ... in Paris.

Bruno Follet
Heure Exquise! Distribution
exquise@nordnet.fr

Director
Juliette Marchand

Producer
ENSAD Aii

Contributors
Juliette Marchand

Levi's "Socks"

For director Michael Bay, Propaganda Films, and agency client TBWA Chiat Day, Digital Domain was asked to create a provocative and photo-real couple in various stages of undress for Levi's latest advertising campaign. Digital Domain is known for its "invisible" effects work. "Socks" effects not only required rendering the couple invisibly but, more importantly, required creating photo-real 3D CG clothing to be tracked over the existing plate photography in such a way as to make the invisible gag seamless.

Bob Hoffman
Digital Domain, Inc.
bhoffman@d2.com

Visual FX
Digital Domain

VFX Supervisor
Fred Raimondi

VFX Producer
Todd Isroelit

VFX Coordinator
Allyse Manoff

Animation Supervisor
Bernd Angerer

Composite Supervisor
Scott Rader

Compositors
David Stern
Perri Wainright

Animators
Mark Brown
Keith Hughes
Dan Loeb
Patrick Lowery
Joe Mandia
Dan Fowler

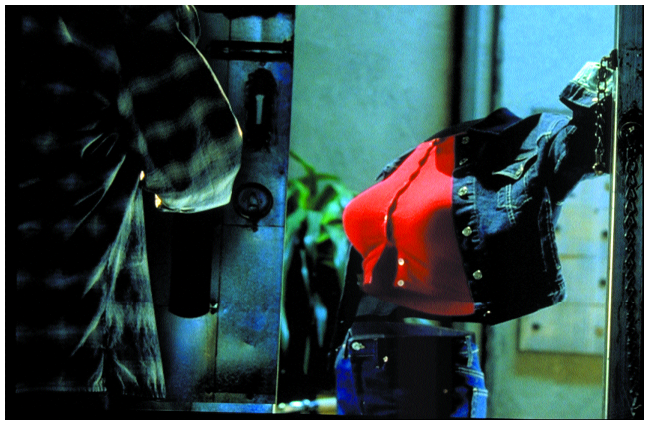
3D Modeler
Vernon Wilbert

3D tracking
Messrob Torikian

Texture Painter
Shannan Burkley

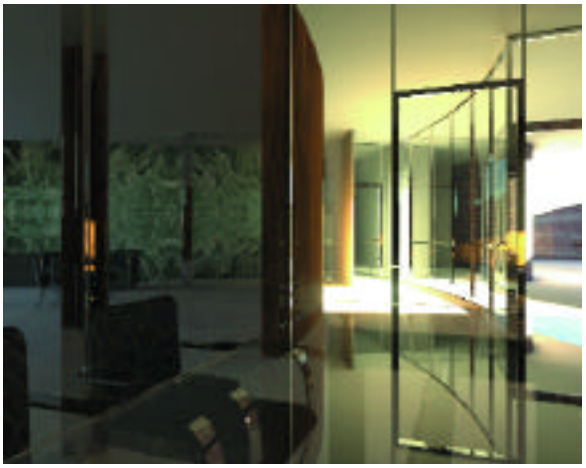
Roto/paint
Tonia Young

Roto
Byron Werner
Michael Frick
Lou Pecora



The Light of Mies van der Rohe

This animation demonstrates how global illumination using photon mapping can be used to explore the light flow in a complex architectural model: the unbuilt Courtyard House with Curved Elements by Mies van der Rohe. The animation was rendered on a Linux-based render farm using custom global-illumination software. Our technique is described in detail in Course 8 and Course 30.



Henrik Wann Jensen
Stanford University
henrik@graphics.stanford.edu

Director
Henrik Wann Jensen

Producer
Henrik Wann Jensen

Contributors
Stephen Duck
Massachusetts Institute of Technology

Lily

"Grandma, my lilies are blooming today."

"Oh, is that so?"

"Why are lilies so white?"

"Well, it's an old story of a time ..."

Software: Softimage 3D, After Effects, Photoshop.

Takashi Sakai
Digital Hollywood
haori@mail.awave.or.jp

Director
Takashi Sakai

Producer
Takashi Sakai

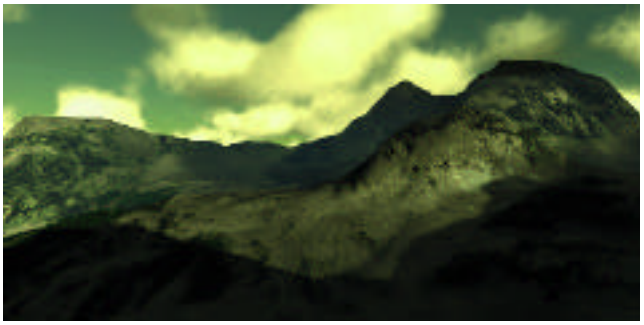
Little Fluffy Clouds

A simulation of light scattering in the atmosphere as a layer of clouds develops. The simulation includes a physically based skylight model, and it takes into account multiple scattering, global illumination, and spectral sampling.

Henrik Wann Jensen
Stanford University
henrik@graphics.stanford.edu

Director
Henrik Wann Jensen

Producer
Henrik Wann Jensen



The Longest Journey

"The Longest Journey," a computer game adventure set in parallel worlds of magic and science, features over 30 minutes of rendered video, which is used to tell the story of April Ryan, a young woman with the ability to "shift: between twin realities." Software used in the production included 3D-Studio MAX 2 for modeling and rendering, and Adobe Premiere 5.1 and After Effects 4 for post-processing, as well as a motion capture system for the character animations.

Amanda Ronai
Funcom
amandar@funcom.com

Director
Didrik Tollefsen

Producer
Ragnar Turnquist

Contributors
Ragnar Turnquist
Didrik Tollefsen
Renate Andersen
Christian Enger
Lars-Petter
Anfinsen Iwan
Scheer Rune
Spaans¨yvind Jernskau
Amanda Ronai
Thorolf Tunjum
Kjetil Hjeldnes
Bjorn-Arve LagimT

Lucie

This is the story of a sad clown.

Bruno Follet
Heure Exquise! Distribution
exquise@nordnet.fr

Directors
Nicolas De Contes, J r me Lesage, Renaud Roulet

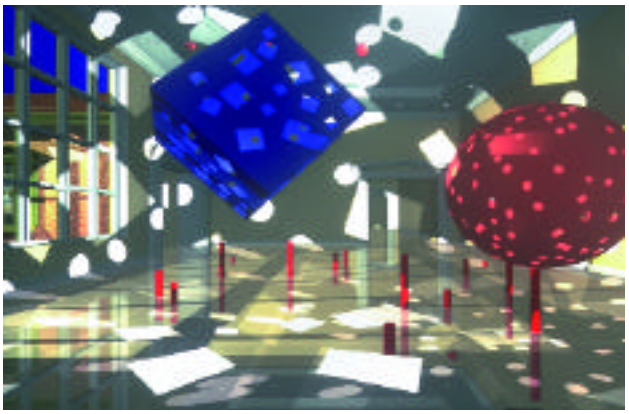
Producer
SUPINFOCOM

Contributors
Nicolas De Contes, J r me Lesage, Renaud Roulet

Luminaries: The Sunset

Light-emitting kinetic sculptures are seen in a museum setting. Other sculptural objects interact with the space in real and impossible situations. The function of the non-light-emitting objects is to define the space as a solid form. At the same time, these objects reveal (through use of intersecting surfaces) that the space is merely an illusion created in virtual space. All of these events occur during sunset. Both the sun and the light emitting objects define the space through light. Both keyframe and dynamics were used in the animation process.

Software: Maya 2.5 and Maya Composer 5.0.



David Haxton
haxtond@aol.com

Director
David Haxton

Producer
David Haxton

Magnolia

Frogs rain down on Los Angeles in the final episode of this multi-storied tale. Soft-body collisions, dynamic simulation, and character animation were blended with live-action cinematography to create this amphibian apocalypse.

Yves Metraux
Industrial Light & Magic
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Visual Effects Supervisor
Joe Letteri

Visual Effects Producer
Camille Geier

Animation Supervisor
Paul Griffin

CG Supervisors
Gregor Lakner, Greg Maloney

Lead Animator
Marjolaine Tremblay

Modeling Supervisor
Tony Hudson

Frog Construction
Aaron Pfau, Derek Gillingham

Production Coordinator
Robin Saxen

Digital Artists
Matt Bouchard, John Helms, Joshua Levine, Tia Marshall, Steve Molin, Julie Neary, Barbara Townsend, Andy Wang, Lindy Wilson

Animators
Colin Brady, John Zdankiewicz

Color Timing Supervisor
Bruce Vecchitto

Lead Matchmover
Luke Longin

Matchmovers
Danielle Morrow, Jeffrey Saltzman

Digital paint and roto
Beth D'Amato, Mike Van Eps

Art Director
David Nakabayashi

Digital Matte Artist
Brian Flora

Software R&D
Florian Kainz, Zoran Kacic-Alesic

Visual Effects Production Assistant
Leslie Safley

Visual Effects Editor
Michael Gleason

Visual Effects Assistant Editor
Lorelei David

Production engineering software
Josh Seims

Technical support
Jason Brown, Ian McCamey, Michelle Motta

CG operations
Vicki Beck, Tony Hurd

Negative line-up
Andrea Biklian

Digital plate restoration
Michelle Spina, Stephanie Taubert

Scanning
Mike Ellis, Todd Mitchell

Senior Staff
Chrissie England, Patricia Blau, Jim Morris

Matador

A young matador bulldog believes that bullfighting is his duty. Now, it's show time!

Software: Maya, Photoshop, After Effects
Hardware: SGI O2 , Macintosh G3

Akemi Tanuma
Digital Hollywood
ake.84@a7.mnx.ne.jp

Director
Akemi Tanuma

Producer
Akemi Tanuma

The Matrix

A computer hacker learns from mysterious rebels about the true nature of his reality and his role in the war against the controllers of the matrix.

Dyann Espinosa
Manex
dyann@mvfx.com

Directors
Larry & Andy Wachowski

Producer
Joel Silver

Contributors
MVFX, a division of Manex Entertainment

Visual Effects Supervisor
John Gaeta

Visual Effects Producer
Diana Giorgiutti

Mazda "Cool World"

Live action car and people using a 1/12-scale model morphing "block world" city composited in 2D Flame.

Scot Byrd
Rhythm & Hues Studios
scotb@rhythm.com

Director
Charlie Watson

Executive Producer
Michael Crapser

Contributors
Darcy Leslie
Paul Laufer
Chuck Schuman
Bradley Thoradson

Production Designer
Kathy Siegel

Flame Artist
Tim Miller

Melvin: The Red-Headed Stepchild

"Melvin" was created and designed to demonstrate the unique capabilities presented by the successful blend of Giant Studios'CG production and motion-capture teams. Using a life-sized stuffed teddy bear and a performer for the role of Melvin, both characters were captured simultaneously using our proprietary Motion Reality system. The basic concept is a rude child who takes out his frustration at going to bed on his favorite teddy bear until his teddy bear retaliates.

Software: Alias|Wavefront's Maya 2.0 Unlimited. Hardware: Intergraph Wildcat GL2 systems. Final composite was done in Adobe After Effects 3.1.

Kathleen Fitch
Giant Studios
kathleen@giantstudios.com

Director
Mike McCormick

Producer
Candice Alger

Contributors
Kurt Judson, Michael Kennedy, Jeremy Garrison, Brian Windsor, Kelly Nelson, Matt Madden, Jeff Askew, Dave Henshaw, Robert Taylor

The Metamorphosis

In this animation based on Franz Kafka's novel, Gregor wakes up to find himself turned into a giant bug. His family, concerned about his unusual behaviour, surrounds his room and attempts to get him to come out. The film ends when his family discovers Gregor's metamorphosis.

Charlie Ramos
Filmtel S.A.
cramos@lucasarts.com
Info@filmtel.com

Director
Charlie Ramos

Producer
Charlie Ramos

Lighting and camera
Begonia Colomar

Animator
Feba

Screenplay
Dierdre Scully

Voice of Father
Carl-Heinz Teuber

Voice of Chief Clerk
Brian Vouglas

Voice of Mother
Dierdre Green

Voice of Sister
Dierdre Scully

Mime In A Box

"Mime In A Box" is a presentation of the classic mime routine of the same name, except that this one ends with a macabre twist. This piece is an experiment in character animation. Can a simple character, by sole virtue of its performance, create an emotional attachment with the audience? This piece also served as an exercise in simplification for 3D animation students at the Atlanta College of Art.

Animation was done in Lightwave 3D 5.6 for Macintosh over a period of two months. The scene clips were assembled in Adobe After Effects. Harmony Assistant was used to arrange the music and generate the digital sound files, which were output to tape using a Media 100qx system.

Eric Kunzendorf
The Atlanta College of Art
kunzendorf@mindspring.com

Director
Eric Kunzendorf

Producer
Eric Kunzendorf

Mission to Mars

An expedition to Mars is destroyed by a monstrous vortex of dust and wind, a natural phenomenon with supernatural qualities. For "Mission to Mars," The Secret Lab, formerly Dream Quest Images, was charged with creation and animation of this character, investing it with a menacing and predatory nature. The process began with conceptual art and animatics depicting vortex movements that suggested a purposeful choreography while also indicating flow, intensity, visibility, motion blur, and wind direction. The computationally intensive final shots were executed with Hookah, the company's proprietary fluid-dynamics simulator and volumetric renderer, which was also used on "Armageddon."

Mary Reardon
The Secret Lab
mary.reardon@disney.com

Director
Brian De Palma

Producer
Tom Jacobson

Visual Effects Supervisor
Hoyt Yeatman

Visual Effects Producer
Rae Griffith-Gagnon

Digital Effects Supervisor
Darin Hollings

Animation Supervisor
Matt O'Callaghan

CG supervisor
Scott Gordon

CG Supervisor
Teddy Yang

Compositing Supervisor
Blaine Kennison

Art Director
Peter Lloyd

Software Developer
Lewis Siegel

Morgan: Miss Parker

Creation of a city in 3D. Modeling of cars and a crane in 3D as well, but with a 2D-look rendering.

Software: Softimage

Pierre Buffin
Buf Compagnie
contact@buf.fr

Director
Alex & Martin

Producer
Partizan Midi Minuit

Contributors
Buf Compagnie

Nebular

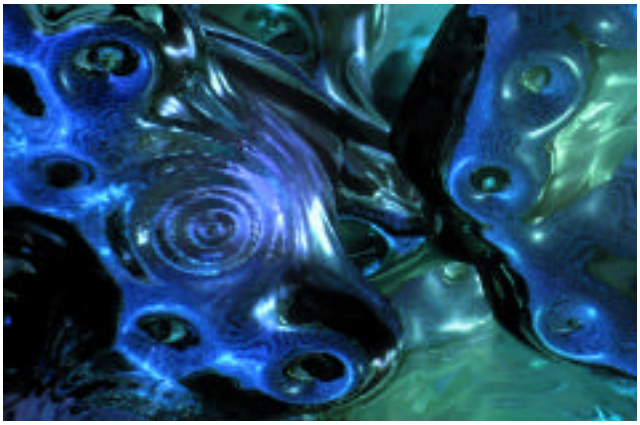
This piece is a result of artistic impression and scientific reasoning. I wanted to explore topological geography in a virtual universe using my self-organizing processes. Images from the Hubble Space Telescope look like images of microscopic creatures, which inspired my new vision, including a new texture and developing process for the surface, with viscosity and gravity.

Yoichiro Kawaguchi
The University of Tokyo
yoichiro@race.u-tokyo.ac.jp

Director
Yoichiro Kawaguchi

Producer
Yoichiro Kawaguchi

Contributors
Naohiro Shichijo, Shinji Sasada, Tadashi Ichikawa, Shoichiro Iwasawa, Yasuichi Kitamura, Kumiko Kushiyama



The Nightshift

"The Nightshift" is a short story about a dispute between the monster-in-the-closet and the monster-under-the-bed over who gets to scare the kid that evening. The film combines live-action background plates with two computer-generated characters. The live action was shot with a digital camera, and the two monsters were created and animated with PowerAnimator and Maya, and composited with the live action in Adobe After Effects.

David Kury
University of California, Los Angeles
dkury@yahoo.com

Director
David Kury

Producer
David Kury

Contributor
Ilya Lie-Nielsen

Nike

The point of this work was to create a universe for a video game in which Leo, the hero of the commercial, accomplished various exploits in each game. The commercial was made entirely in 3D and did not require live-action shooting. The work was organized in five months with: design of 11 sets and interactive graphics, creation and modeling of the characters, animation of the whole work, and its rendering. The main challenge was to successfully create a multitude of sets and atmospheres.

Software: In-house software, Softimage, Mental Ray, Flame.

Pierre Buffin
Buf Compagnie
contact@buf.fr

Director
Michel Gondry

Producer
Partizan Midi Minuit

Contributors
Buf Compagnie, Wieden & Kennedy

NIUMB

The story of the “bird fishers.”

Hardware: 3D computer

Rapha l Lacoste
Centre National de la Bande Dessinée et de l’Image
Din@Cnbdi.Fr

Director
Rapha l Lacoste

Producer
Centre National de la Bande Dessin e et de l’Image

Sound supervision
D. et M. Fano

PAF le moustique

One night in Paris, a guy absorbed in listening to music and blowing gum bubbles, attracts a music-loving mosquito. This is a full 3D, hand-animated, home-cooked short film.

Software: Alias|Wavefront Maya 2.0. Hardware: PC-compatible workstations.

Pascal Ebony
PAF Production
Ebonypascal@hotmail.com

Director
J.F. Bourrel, J. Calvet

Producer
J.F. Bourrel, J. Calvet

Contributors
Pierre Villette, Christophe Delamare, Eric Gilbert, Fabrice Smadja, Pascal Bonifay, David Calleaux

Pensive

Working in Maya, complex shading networks render the layered cross-hatching effects in a single pass. Shots feature variations of a "toon" shader that combines hand-drawn textures and watercolor paintings with ray traced reflections and lighting effects for an unconventional look. The fire animation uses a single hatch-mark as a sprite in a particle system and was composited in Composer. This animation was produced "after-hours" at the Imaging Research Center, University of Maryland, Baltimore County.

Tim Best
University of Maryland, Baltimore County
tbest1@irc.umbc.edu

Director
Tim Best

Producer
Tim Best

Contributors
Tim Best, Heather Bowen

Calm seas had already been done in computer graphics. The ultimate challenge was 50- to 100-foot waves with 80-knot winds! In order to make the ocean and the boats battling through it look absolutely real, and to push the audience into the violence and fury experienced by the boat crews, several fluid and boat dynamics were used with complex shaders, large-scale particle/blobby systems, and other techniques to create a range of visuals to represent the storms as they progress through the film.

Yves Metraux
Industrial Light + Magic
yves@ilm.com

Special visual effects and animation by Industrial Light + Magic

Visual Effects Supervisor
Stefen Fangmeier

Visual Effects Producer
Ginger Theisen

Visual Effects Associate Supervisors
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Doug Smythe
Habib Zargarpour

Visual Effects Associate Producer
Gretchen Libby

Senior Visual Effects Producer
Judith Weaver

Additional Visual Effects Supervision
Stephen Rosenbaum

Computer Graphics Supervisors
Dan Goldman
Curt Miyashiro

Computer Graphics Sequence Supervisors
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Joel Aron
Gerald Gutschmidt
Samir Hoon
Henry Preston
Robert Weaver

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Pat Conran
Kathy Davidson
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Dean Foster
Christian Foucher
Todd Fulford
John Helms
Neil Herzinger
Christina Hills
David Hisanaga
David Horsley
Chris Horvath
Peg Hunter
Polly Ing
Hilmar Koch
Ed Kramer
Erik Krumrey
Vinh Le
Mohen Leo
Joshua Levine
Jeff Light
Jonathan Litt
Steve Molin
Daryl Munton
Jai Natarajan
Masayori Oka
Khatsho Orfali
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Mayur Patel
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Philippe Rebours
Kevin Reuter
Frederic Schmidt
Durant Schoon
Paul Sharpe
Dan Shumaker
Kevin Sprout
Doug Sutton
Marc Toscano
Hans Uhlig
John Walker
Jeroen Lapre
Jeff Shank
Will Anielewicz
Howard Gersh
Indira Guerrieri
Nigel Sumner
Chris White
Gregor Lakner
Raul Essig
Dan Lobl
Doug MacMillan
Maximillian Rochetti
Andy White

Compositors
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Mike Conte
Jay Cooper
David Deuber
Dave Fuhrer
Bill Gilman
Stephen Kennedy
Marshall Krasser
Kimberly Lashbrook
Greg Maloney
Sean MacKenzie
Julie Neary
Eddie Pasquarello
Vince DeQuattro
Barry Safley
Patrick Tubach
Susan Weeks
R. Jay Williams
Ken Ziegler
Jeff Ertl
Brian Sorbo
Catherine Tate
Rita Zimmerman
Stella Bogh
Tami Carter
Jeff Sutherland

Animation Supervisor
Peter Daulton

Animators
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Mike Ford
David Hanks
Melissa Mullin
Andy Wong
Sylvia Wong

Assistant Technical Directors
Jason Brown
Brian Gee
Brain Kasper
Jason Rosson
Anthony Shafer
Jennifer Nona
Kimberly Ross
Joseph Metten

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Rod Bogart
Florian Kainz
Vishwa Ranjan
Christian Rouet
Eric Texier

Digital Timing Supervisor
Kenneth Smith

Visual Effects Editor
Scott Balcerek

Visual Effects Coordinators
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Leslie Safley
Robin Saxen

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Jonathan Harb
Ivo Horvat
Alex Jaeger

Digital Model Supervisor
Stewart Lew

Digital Model Development
Dugan Beach
Sunny Lee
Janice Lew
Russell Paul
Alexander Pouchkarev
Emmanuel Shiu
Sunny Wei

Lead Viewpaint Artist
Elbert Yen

Viewpaint Artists
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David Tamura
Ron Woodall

3D Matchmove Supervisor
Keith Johnson

3D Matchmove Artists
Maurice Bastian
Mike Halsted
Randy Jonsson
Jodie Maier
Jeff Saltzman
Dani Morrow

Digital Paint and Roto Supervisor
Jack Mongovan

Digital Paint and Roto Artists
Trang Bach
Katie Baird
Michaela Calanchini
Susan Goldsmith
Kela Hicks
Siobhan Lo
Aaron Muszalski
David Sullivan
Kate Turner
Erin West

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Dana Masino
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Marc Sadeghi
Stacey Shear
Camille Eden

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Tony Pitone

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Kim Orla-Bukowski
Nicole Samarron
Bernard Von Zastrow
David Weatherly

Computer Systems Engineering
Bill Hirsh
Jeff King
Michael Thompson

Video Engineering
Kipp Aldrich
Craig Mirkin

Film Scanning Supervisor
Josh Pines

Film Group
Michael Cordova
Randy Bean
Andrea Bilkian
George Gambetta
Michelle Gray
Doug Jones
Katrina Stovold

ILM Managers
Brian Brecht
Vicki Dobbs Beck
Jay Johnson
Nancy Luckoff
Ken Maruyama
Cliff Plumer

ILM Senior Staff
Jim Morris
Patty Blau
Gail Currey
Chrissie England
Jeff Mann

PiNMeN

This is a story about aliens from outside this space. They're amazed that people on Earth can be easily deceived. They're called "PiNMeN." This short animation tries to express emotions of characters by simple shading and lines. It was also an attempt to make 3D CG animation alone, with Softimage's ToonShader. Hardware: SGI O2. Software: Softimage.

Masaaki Taira
TRILOGY Corporation
taira@trilogy.co.jp

Director
Bak Ikeda
TRILOGY Corporation

Producer
Masaaki Taira
TRILOGY Corporation

Porkchops: Episode #1

One of Bullseye Art's most well-loved cartoons, "Porkchops" is where the Donkey goes to mingle. Co-starring Monkey meat, Vikings, little Chinese girls, and the Wagina pony. A song with every episode blurs the lines of this cartoon into a true culmination of the last 20 years of pop culture.

Louis Zwiebel
Bullseye Art, Ltd.
louis@bullseyeart.com

Director
Josh Kimberg

Producer
Nick Cogan

Contributors
Shii Ann Huang, Ryan Edwards, Brian Hersey, Greg Minnig, Peter Parpan, Peter Michail

Protest

A dream-like meditation on the plight of the elephant, whose natural habitat shrinks each year.

Software: 3DS Max, Photoshop, After Effects. Hardware: PC.

Josselin Mahot
www.pitchtv.com
josselin@pitchinc.com

Director
Steve Katz

Producer
Russ Dube

Contributors
Chris Gilligan, Josselin Mahot, John Payne

Pump-Action

"Pump-Action" is an independent four-minute CG animation that follows the conflict between inflatable characters of various materials in a workshop setting. This project is a solo effort by Phil Captain 3D McNally, in his first short film. It took 14 months to complete, using Mac G3's and Cinema 4D XL.

Phil Captain 3D McNally
captain3d@pump-action.co.uk

Director
Phil Captain 3D McNally

Producer
Phil Captain 3D McNally

Rhythms "Data Dancers"

A trio of computer-animated "data" dancers personify the voice, data, and full-motion video that can be delivered in concert over Rhythms'high-speed DSLlines. Choreographed to George Gershwin's "I Got Rhythm," the dancers were motion captured and brought to life in the CG world by Industrial Light + Magic's Commercials Production Division.

Yves Metraux
Industrial Light & Magic
yves@ilm.com

Director
Wade Howie

Producer
Paul Hill

Production Supervisor
Andrea Smith

Post Production Supervisor
Lyndal Heathwood

CG Lead
Mary Beth Haggerty

Technical Directors
Kevin Sprout, Marcus Stokes, Tripp Brown, Paul Churchill

Animators
Scott Benza, Jonathan Lyons

Modeler
Tony Hudson

Art department
Tad Leckman, Randy Gaul

Motion capture
Seth Rosenthal, Ann McColgan

Lead Flame Editor
Orin Green

Editor
Nick Seuser

Assistant TD
Cedrick Chan

Video Technical Assistant
Lee Djokovic

Technical Assistants
Grace Lan, Scott Younkin

CG Resource Assistant
Mike Peters

Executive Producer/Division Manager
Marcie Malooly

Head of CG Commercials
John R.A. Benson

Commercial Editorial Manager
Mark Tellegen

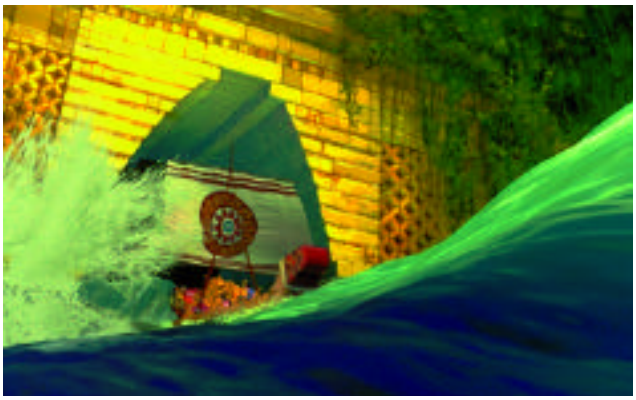
CGC Production Manager
Danielle Dubay

CGC Project Manager
Luke O'Byrne

CGC Production Assistant
David Mammola

The Road to El Dorado

Doug Ikeler created a tool set called Spryticle to do complex, rapid water effects using flat digital cards that carry triggered playback of scanned traditional 2D animation. The cards in Spryticle can be bent, curved, stretched, and positioned to allow display of the 2D hand-drawn splashes without a visual or mechanical repetition of shape and element. A 3D light can be used to add a greater sense of apparent volume to what is actually a virtual distorted flat surface.



Jennifer Cohen
DreamWorks SKG
jcohen@dreamworks.com

Directors
Eric "Bibo" Bergeron, Don Paul

Producers
Bonne Radford, Brooke Breton

Contributors
Doug Ikeler, Gigi Yates, Patrick Witting, DreamWorks Feature Animation

Samurice

At the beginning of the 17th century, feudal Japan was about to enter into the modern era. In a small rice paddy, a clan of Samurai Rice have had their most prized possession stolen: the Soya Scroll. This ancient parchment contains the ingredients to a magical Soya Sauce that gives the Samurice special martial and spiritual powers that makes them the strongest of the Rice clans. It is believed that a rival bushel of Ninja Rice is responsible for the theft. A young, hot-headed Samurice named Ricesashi has been sent to locate the Ninja's secret hideaway and verify them as the thieves.

James Bennett
Queensland University of Technology
james_bennett2@yahoo.com

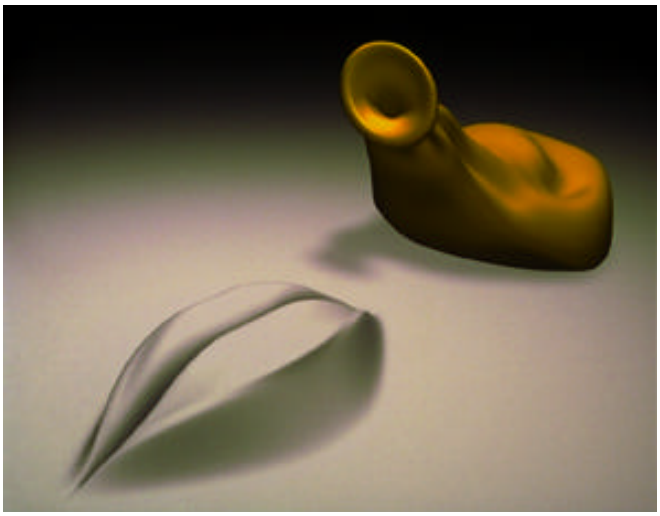
Director
James Bennett

Producers
James Bennett, Andrew Silke

Contributors
Department of Communication Design
at the Queensland University of Technology

Satisfaction

"Satisfaction" is a 3D animation that attempts to communicate the fleeting satisfaction of our desires in a humorous way. Created in Maya software, a surrealist scene dominated by a solitary mouth signals a balloon to "partake" of its services. The balloon is satiated, but only temporarily. As the mouth releases its grip, the balloon shoots off into the distance, leaving a trail of digital debris.



Jack Stenner
Texas A&M University
stenner@pursebuilding.com

Director
Jack Stenner

Producer
Jack Stenner

Contributor
Keith Klohn

The Scarecrow

Sometimes you have to use your limitations in life to your advantage. When life presents you with problems, it is amazing how far a little creativity can go. In this story, a little scarecrow comes to life in a midwestern corn field. He is presented with a problem, and he uses his own limitations to overcome it.

Software: Maya 2.0. Hardware: SGI O2.

Cheryl Meier
Ringling School of Art and Design c/o Susan Trovas
CherMeier@aol.com

Director
Cheryl Meier

Producer
Ringling School of Art and Design

Contributors
The support of my faculty, my colleagues, and my family.

Shapes of the Invisible: Butterfly

For the very first time, we discover, through a continuous forward zoom, the microscopic structure of everyday things and explore astonishing and unexpected landscapes that lead us to the atomic texture.

Turkieh Gabriel
Altomedia
altomail@worldnet.fr

Directors
J-M Sanchez, P.O. Levy, G.Turkieh

Producer
Altomedia

Contributors
Cite Des Sciences Et De L'industrie, Ex-Nihilo, Aune Productions

Shine

Ever wonder what those "moonshiners" do in the daytime? This is a sing-a-long glimpse into their backwoods lifestyle.

Tiann Arnault
Vancouver Film School
arnault@vfs.com

Director
Kenneth Meyer

Producer
Kenneth Meyer

Sound FX Engineer
Brett Anthony

Music Mix
Mark Henning

Guitars
Jeff Hawkinds

Vocals
Kenneth Meyer

Skiddles

What started out as an exercise in motion tracking and compositing turned into an amusing parody of the M&Ms animated commercials. We wanted the two main characters to have more of an urban flavor, in contrast to the M&Ms'obvious generic anglo characters.

This animation was created entirely with 3D Studio Max 3.1.

Brett Baker
Exodus Entertainment, Inc.
vfxwiz@hotmail.com

Director
Devon Browne

Producer
Brett Baker

Contributors
Randy Gossman, Adny Angrand, Jorge Verera, Nick Schreiber, Monty Clark

Music
Douglas Thornton

Sound design
Post Scores: Ashley Shepard, Douglas Thornton

Smart

A dinosaur is wandering through town, crushing everything on its way except Smart, a car. Realistic integration of a 3D dinosaur. Modeling, animation, and integration of a dinosaur and other elements (crushed cars, people on blue background).

Software: In-house software (modeling, rendering, and integration of dinosaur), Softimage (animation), Flame (smoke integration, car, and people).

Pierre Buffin
Buf Compagnie
contact@buf.fr

Director
Dario Piana

Producer
Filmmaster

Contributors
Buf Compagnie

Space Station Fly-Through

3D fly-through of a space station done as part of a series of animations for the Advanced Software Engineering Center of PricewaterhouseCoopers in Philadelphia. Three different 3D programs and custom lighting-setup software were used to generate this piece.

Platform: IBM PC. Software: LightWave 3D 5.6, LightScape 3.1, 3D Studio Max 2.0, Darktree textures 1.0, Adobe Photoshop 5.0, various LightWave plug-ins, and 3D Studio Max programs.

Mark Bamforth
PricewaterhouseCoopers
Mark.Bamforth@US.PwCGlobal.com

3D animation/programming
Mark Bamforth

Producer
PricewaterhouseCoopers

Storyboard/art direction
Carmen Roman

Sound
John Callifra

ssplootsshhh

An explanation of the existence of flattened hedgehogs on the roads.

Maya 1 and 2, PII 300.

Olivier Junquet
A.T.I.
olivier_junquet@yahoo.fr

Director
Olivier Junquet

Producer
Olivier Junquet

Sound Mixer
Patrick Moriceau

Starsheeps

Good soldiers are dreaming...

Bruno Follet
Heure Exquise! Distribution
exquise@nordnet.fr

Directors
Antoine Deschamps, Jovann Leblanc, Alban Vandekerkove

Producer
SUPINFOCOM

Contributors
Antoine Deschamps, Jovann Leblanc, Alban Vandekerkove

Stick Figures: A Virtual Concert

Self-playing instruments perform a virtual concert. Procedural animation techniques are applied to automatically generate all instrument motion directly from the MIDI score with note/frame accuracy. These procedural animation algorithms are third-generation extensions of those used in a SIGGRAPH 90 piece by the same director: "More Bells and Whistles."

Wayne Lytle
Animusic
wayne@animusic.com

Director
Wayne Lytle

Producer
Wayne Lytle

Contributors
Wayne Lytle, David Crognale

"Stuart Little: The Boat Race"

In the Academy Award-nominated film "Stuart Little," the boat-race sequence formed a critical, action-packed storypoint for the tale of family and friendship. The sequence features state-of-the-art digital character animation and the latest developments in digital fur and cloth.

Don Levy
Sony Pictures Imageworks
don_levy@spe.sony.com

Directors
Rob Minkoff, Henry F. Anderson III

Producers
Douglas Wick, Michelle Murdocca, Debbie Denise

Contributors
John Dykstra, Jerome Chen, Jay Redd, Jim Berney, Scott Stokdyk, Bart Giovanetti

Subconscious Commercial Insertion

Submitted in response to the Computer Animation Festival's request for Messages from the Future

In the future, companies will be purchasing air time not to try to sell products, but rather to "insert" subconscious suggestions that will virtually guarantee purchase of their products. Scary? This 30-second spot was created on a Macintosh, using After Effects, Photoshop, Freehand and Premiere. Video footage was filmed on DV with a Cannon XL-1.

Jeffry Gugick
PhotomediaVR.com
jeffrysg@hotmail.com

Director
Jeffry Gugick

Producer
Jeffry Gugick

Actress
Tamara Kramer

Filming/Lighting Assistant
Richard Kampas

Sumo Air

A sumo wrestler, who wants to experience life to its fullest, goes skydiving, despite the fact that he weighs more than a Buick. Ignoring his obvious limitations, he uses ingenuity to overcome adversity and experience his dreams.

Ryan Powell
Ringling School of Art and Design c/o Susan Trovas
rpowell@rsad.edu

Director
Ryan Powell

Producer
Ringling School of Art and Design Computer Animation

Contributors
CA Faculty

Swingy And The Magic Hat

Swingy demonstrates his skills as a magician, but he is not alone, because he has to deal with a cheeky rabbit, who may be more clever than he looks.

Hardware: 3D computer.

Franck Laurin
Centre National de la Bande Dessinée et de l'Image
Din@Cnbdi.Fr

Director
Franck Laurin

Producer
Centre National de la Bande Dessin e et de l'Image

Music
Davide Tromba

Switch

This commercial features the M&Ms characters eating M&Ms candies. The piece was created with Lightwave on Dec Alphas.

LuAnn Graver
Will Vinton Studios
luann@vinton.com

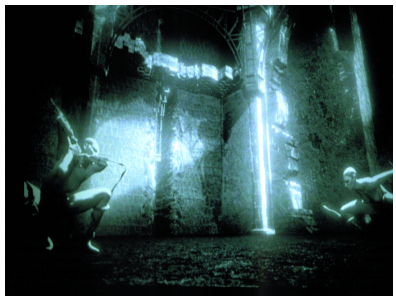
Director
Kirk Kelley

Producer
Rachel Walchak

Contributors
Will Vinton Studios

Synchronicity

"Synchronicity" is an entirely computer-generated dance allegory. The passage of time, and the evolution of the characters, is augmented by a progression of stylistic looks. The complex choreography was captured using the Vicon 370 optical motion-capture system. Nearly 100 markers were used to capture all of the subtleties of the performance. Vicon, Filmbox, Softimage, and ILM proprietary software were used to reconstruct and apply the motion-capture data to the CG dancers. The CG environment was constructed in Softimage, surfaced with Renderman, lit with ILM proprietary software, and ultimately demolished using a Maya rigid-body simulation.



Hans H. Uhlig
Bay Vista Productions
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Director
Hans H. Uhlig

Producer
Tony Hurd

Computer Graphics Supervisors
Tim Alexander
Jeremy Goldman
Hayden Landis
Sean Schur

Camera
Stefen Fangmeier

Digital lighting setup and ending sequence
Christian Foucher

Computer Graphics Artists
Mario Capellari
Paul Churchill
Mike Conte
Lindy De Quattro
Vince De Quattro
Jeff Ertl
Todd Fulford
Peg Hunter
Dan Lobl
Jennifer McKnew
Patrick Neary
Ricardo Ramos
Frederic Schmidt
Jeff Shank
Douglas James Smith
Ken Wesley

Digital Paint Artist
Patrick Jarvis

Digital model development and construction

Artists
Dugan Beach
Andrew Cawrse
Jim Doherty
Michael Easton
Aaron Ferguson
Paul Giacoppo
Rick Grandy
Paul Kavanagh
Corey Rosen
Susan Ross
Tony Sommers
James Tooley

Motion Capture Producer
Sandra Scott

Motion Capture Supervisors
Jeff Light
Mike Min

Film Recording Supervisor
Joshua Pines

Editor
Carey Burens

Negative Cutter
Doug Jones

Choreography
Paula Telander
Phyllis Cagnolatti

Dancers
Tanyce Alaga
Sheri Spellwomen

Original musical score
Jim Gardiner

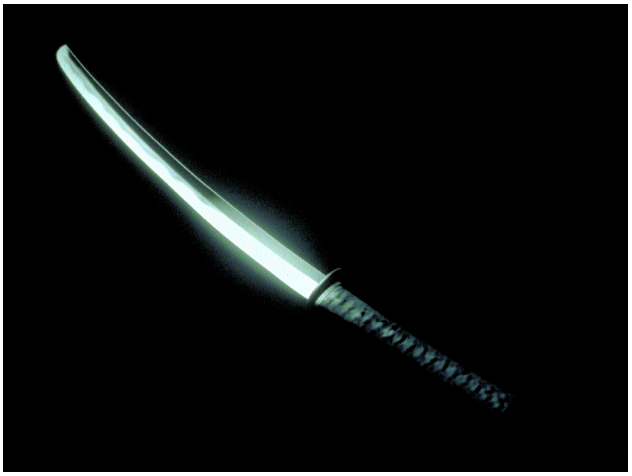
Vocalist
Valerie Matthews

Production and technical support
Michael Cordova
Tim Greenwood
Ian McCamey
Janine McGraw
Jim Milton
Mike Peters
Seth Rosenthal
Mike Sanders

Special Thanks to Industrial Light + Magic

Syokyoan

The last legend of two rough fellows who lived in the violent age.



Koji Yamamoto
Digital Hollywood Masters
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Director
Koji Yamamoto

Producer
Koji Yamamoto

Contributors
Makiko Fujita

Tekken Tag Tournament

Tekken Tag Tournament is a fighting game for Playstation 2 that employs high-quality, real-time 3D graphics. Each playable game character has been constructed using complicated skeletal structures with at least 100 bones in order to fully express their realism. We have been able to achieve very smooth muscle movement on each part of the human body and convey aspects of each character's personality using a variety of gestures and facial expressions. The game plays at a constant rate of 60 frames per second, using real-time animation throughout.

Tetsuya Tat Wakao
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Director
Yoshinari Mizushima

Producer
Namco Limited

Tekken Tag Tournament — Opening Movie

This is the opening movie for the Playstation 2 game "Tekken Tag Tournament." It leads players into the world of Tekken through use of realistic computer graphics. We were able to bring life to the game characters with use of dramatic movement and heightened emotion.

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Director
Kazuki Aizawa

Producer
Namco Limited

Contributors
Yukiharu Taniguchi, Akiko Nakazawa, Shinnichiro Yoda, Tomohiro Yonemichi, Hiroshi Numakami

Tekken Tag Tournament — Ending Movie

This movie is the ending sequence for "Tekken Tag Tournament" on the Playstation 2. The movie depicts the plight of a girl who has long been possessed by an evil spirit and is struggling with the evil force controlling her. After defeating all opponents in the tournament, the girl gains enough strength to overcome the wolf's spirit.

Tetsuya Tat Wakao
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Director
Tatsuya Matsue

Producer
Namco Limited

Contributors
Shinichiro Yoda, Tatsuya Matsue, Tomoyuki Tsuru, Yoshihito Yano

Tekkon Kinkreet

In Treasure Town, where the moon smiles down and young boys can fly, life can be both brutal and gentle. This is never more true than for the heroes of this saga, Black and White, two orphans who watch over this decaying metropolis. Combining the imaginative fantasy of the best Japanimation with a dark and modern children's'story, " Tekkon Kinkreet," in development for a 2002 release, uses cutting-edge CGI, dynamic action, and the visual styling of a cel-animation master, Koji Morimoto, to create a unique animated feature.

Koji Morimoto
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Director
Koji Morimoto

Producer
Hiroaki Takeuchi

Contributors
Trilogy Corp., Shogakkan Inc., Taiyou Matsumoto, Koji Morimoto

CG Director
Michael Arias

Animation Supervisor
Lee Fulton

Production Designer
Wilson Tang

CG Animation
Koji Ono, Naoko Sugita, Takahiro Oniki, Takashi Kuwabara, Katsumi Yokota, Aki Iesaka

Line Producer
Yukie Saeki

Music
Yoko Kanno

This Guy is Falling

Warren is a dreamer, a nice guy, but not the brightest guy you've ever laid eyes on. He believes in daytime baseball, nights under the stars, and good old-fashioned love. So when the world's gravity turns off accidentally, Warren doesn't sit and ponder the existential ramifications of it all. He's off in a flash to save his girlfriend. "This Guy is Falling" combines live-action film with matte paintings and computer animation. The result is a colorful world that exists between reality and fantasy.

Gareth Smith
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Directors
Gareth Smith and Michael Horowitz

Producers
Gareth Smith and Michael Horowitz

Contributors
Jason Moskovitz, Jino Ok, Damon Seeley, Peter Zaslav, Ari Sachter-Zeltzer

Two programs were created in OpenGL/C++ to generate the images, along with a custom animatable font. The first handled the streaming text background. It increases the rate at which letters are typed, motion-blurring fast images. The second program generates the running man. Random letters are drawn (according to specified animation parameters), and their color intensity is determined by the pixels covered in the Muybridge images. A sequence of images is read in, and animation parameters are applied to the animatable font.

Software: Adobe Photoshop 3.0 and Alias Composer. Hardware: SGI O2s.

Aaron Otstott
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Director
Aaron Otstott

Producer
Aaron Otstott

Contributors
Eadweard Muybridge (running man photographs), Karen Hillier

Toyota Future World Experience

Future World Experience is meant to show the audience what the car society will be in the future. This attraction is both a real roller coaster and virtual travel in future towns. It includes the fastest indoor roller coaster (maximum speed 60 km/h), an astonishing 3D computer graphics production, and a very innovative interactive system. The story: With the Cybercharacter, our guide for this trip, the audience chooses the location to visit (Earth, ocean, air) with the LCD screen in the car dashboard. Then they choose a vehicle design (27 different vehicles are proposed).

Sophie Bordone
ExMachina
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Director
Michel Meyer

Producers
Dentsu, Dentsu Tec, ExMachina

Client
Toyota agency: Dentsu Tec

Digital images
ExMachina

Original Concept
Arish Fyzee

Ride
Intamin

UFO — Boeing JSF

The images in this sequence are 100-percent CGI. No plate photography was used or required for these shots. Terrain and sky backgrounds are either matte paintings or retouched satellite imagery used as texture maps. The Joint Strike Fighter and additional vehicles such as the KC-10 tanker and the USS Stennis aircraft carrier were modeled to exacting detail from blueprints and reference photos. Lighting of the Joint Strike Fighter was achieved with a combination of off-the-shelf tools and in-house shaders. Digital humans were modeled and textured in Lightwave and animated with a proprietary animation software program.

Grant Viklund
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Director
Aristomenis Tsirbas

Producer
Eileen O'Connor

Contributors
Staff of Station X Studios

Ursonates

A chained animation based on the Kurt Schwitters work.

Bruno Follet
Heure Exquise! Distribution
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Producer
SUPINFOCOM

Volume Visualization of the Orion Nebula

In this visualization, viewers are transported 1,500 light years to the heart of the Orion Nebula. The nebula is derived from a 3D polygonal model based on radio and visible light observations from the Hubble Space Telescope and ground-based observations. A custom toolkit converts this polygonal model to 3D volume data with accurate and controllable nebulosity rendition of the various depicted forms. Eighty-four additional volumes were modeled and placed into the scene with 883 stars, using Gaussian footprints for star brightness. The animation was created using custom volume-rendering software that renders multiple, multi-resolution volumes using perspective viewing transformations.

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Contributors
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Steve Napear
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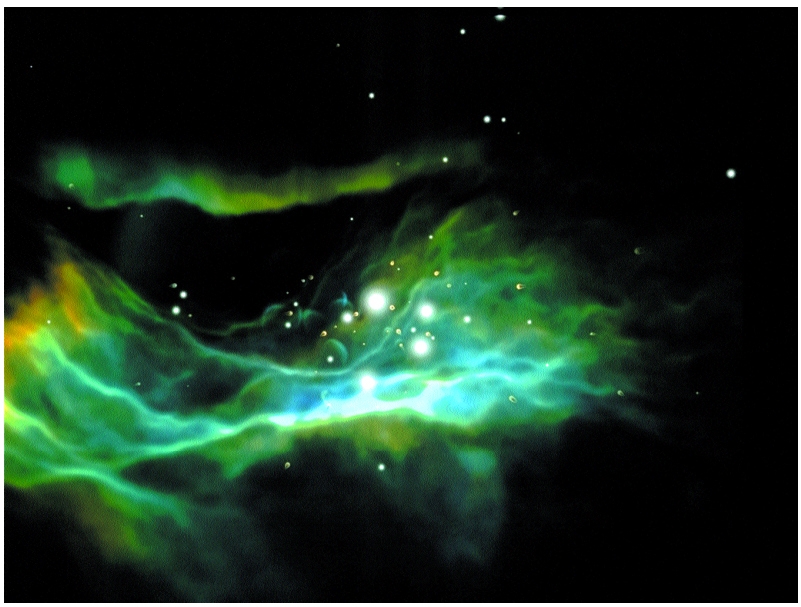
San Diego Supercomputer Center



Walking with Dinosaurs

"Walking with Dinosaurs" is a major computer animation co-production for BBC Science and the Discovery Channel. It features CG dinosaurs set into live-action backgrounds filmed in locations that closely resemble the environments of the appropriate era. The documentary series covers the natural history of the Triassic, Jurassic, and Cretaceous eras, and the design and movement of the CG dinosaurs were guided by an expert team of paleontologists working closely with a small team of animators. The project took nearly three years to complete.

Software: Softimage, Mental Ray, Photoshop, 3DEqualizer, and proprietary tools. Hardware: SGI, PC (NT), Quantel Henry, Inferno.

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Producer
Tim Haines

Computer animation and post production
FrameStore

Director of Computer Animation
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Senior Technical Director
Alec Knox

Technical Director
David Marsh

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Dinosaur skin design
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Texture Artists
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Andy Lomas, Alex Parkinson

Maquette scanning
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Film Editor
Andrew Wilks

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Telecine Colorists
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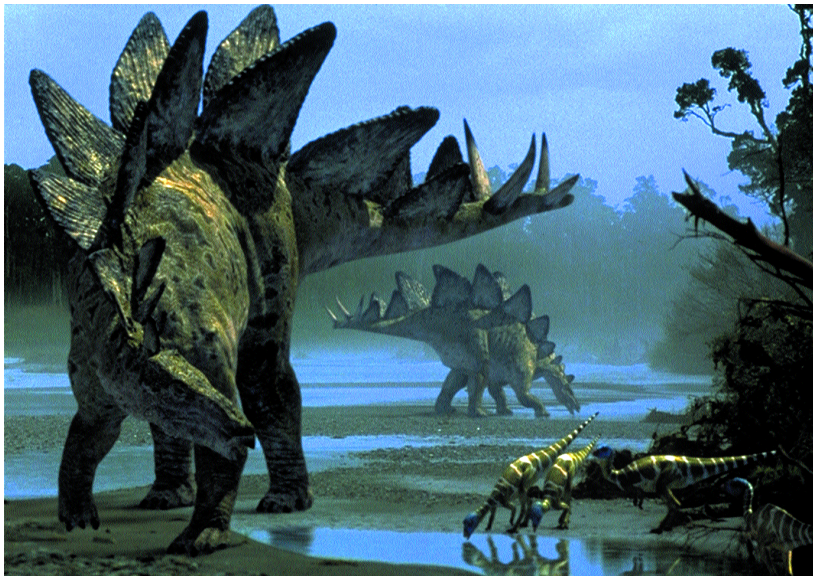
Post-Production Producer
Lottie Cooper

VFX Coordinator
Scott Griffin

Executive Producers Computer Animation
Sharon Reed, William Sargent



When Animals Go Berserk

Karen introduces Kirby to Fluffy Muffins, her schizophrenic kitty cat. Originally aired during “The Big Cartoonie Show” on Kid’s WB.

George Maestri
maestri@ix.netcom.com

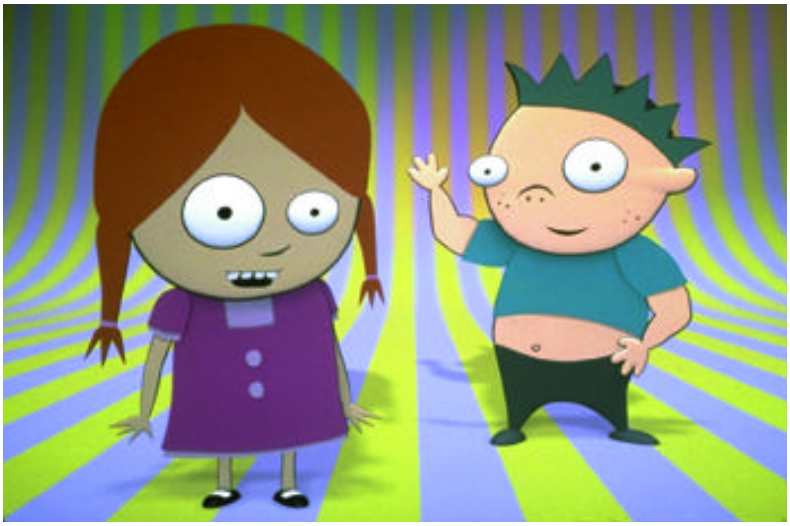
Director
George Maestri

Producers
Jerry Beck, George Maestri

Voices
Cheryl Chase as Karen
Richard Horvitz as Kirby

Animators
Jackie Watson, Warren Fuller, Carlos Juliao, John Baurley, George Maestri

Sound Design
Michael Geisler



Wu Tang: Shaolin Style

Famous Wu-Tang Clan members try to rescue Master Xin and save the world from the evil Mong Zhu emperor while practicing their Wu Tang skills in America and China. The movies were created for the Playstation game Wu-Tang Shaolin Style, based on the rap group Wu-Tang Clan.

All characters were created, animated, and rendered in Softimage 3D. A proprietary Mental Ray plug-in was used to create photo-realistic hair. A proprietary lipsynch tool was used for speech animation and facial expressions.

Daniel Prousline
Creat Studio, LLC
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Produced by Creat Studio, LLC for Activision, Inc.

Activision

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Larry Paolicelli

Story by
Adam Goldberg

Written by
Jay Halderman

Production by Creat Studio
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Daniel Prousline

Cinematic Director
Andrey Kravchuk

Assistant Director
Vladimir Aleksandrov

Project Leader
Avenir Sniatkov

Production sketching
Vitaly Anickin

Character animation
Sergey Boginsky
Anton Lomakin
Alexander Mialo
Anna Ksionz

Face animation
Vladimir Tchernych

Modeling
Fidail Guilmoutdinov
Dmitry Astakhov

Lighting and texturing
Dmitry Kholodov
Natasha Kholiavko

Composing and post processing
Olga Tcremisova

Programmers
Anton Krupkin
Stanislav Volodarsky

Featuring voices of
RZA, Raekwon, U-God, Inspectah Deck, and Katt Brown as Xin, Warren Burton as Mong Zhu

Additional voices
Gregory D. Eagles, Erik King, Tony Masa, Tohoru Masamune

Vocal sound effects
Wu-Tang Clan

Sound design and FX
The Audio Group

Sound Designer
Tim Gedemer, M.P.S.E.

Original music/cut scenes
Howard Drossin

Wyatt Earp

"Wyatt Earp" is a fast-paced, shoot 'em up animated western, set to the tune of "Wyatt Earp Makes Me Burp," a song by 1950s radio legend Spike Jones. It tells the tale of how Wyatt Earp, folk hero, rescues the small dusty town of Tombstone (population 130 and falling) from the notorious outlaw, Big Red, in a climactic gunfight at The Silver Dollar.

Hardware: Intergraph/SGI. Software: Toonz/Photoshop/3D Studio MAX.

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Director
Mark Gravas

Producer
Sandra Walters

Contributors
Loic Morvant

Yamawarasi

This is a midnight fable of three Yamawarasis, who boast and compete with each other. Yamawarasi is our name for a small, innocent monster that lives in old wonder forests surrounded by mountains.

Software: Maya 2.0, Photoshop, Illustrator, Premiere, SoundEdit, Debabelizer.

Tomoyo Nakanishi
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Directors
Tomoyo Nakanishi, Shu Ikegami

Producers
Tomoyo Nakanishi, Shu Ikegami

Contributors
All our friends and our teacher

Young at Heart

An old actress (who has never existed) reminisces in her dressing room as she prepares for the stage. For the first time, a convincingly realistic computer-generated human face (in extreme closeup) is brought to life, set in standard dramatic context. The face was created using the finite-element-based LifeFX facial modeling, animation, and performance-capture system, which dynamically simulates complex skin deformation, including fine wrinkling. Artistic control over facial performance, shape, and skin properties allows LifeFX to be used for digital makeup effects. In this example, an aged impression of a real 26-year-old actress has been created.

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Director
Lol Cr me

Producers
Mark Sagar, Lol Cr me

Directors of LifeFX Development
Mark Sagar, Paul Charette

Visual Effects Supervisor
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The Jester
Jessica Vallot

Old Age Makeup Consultant
Todd Masters

Director of Photography
Gale Tattersall

Editor
Greg DeCamp

Music
Lol Cr me

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