University of Art and Design Helsinki UIAH

ISEA

94

The 5th
International
Symposium on
Electronic Art
Catalogue

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Art and technology in the age of networks? The catalogue of ISEA'94, the 5th International Symposium on Electronic Art contains essays, statements and projects by over 200 artists and researchers from all over the world. The multidisciplinary perspectives of the catalogue range from the electronic environment to cyberotics, from soundscapes to military conversion - the result is a panorama of today's electronic culture.

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ISEA'94 GENERAL INFORMATION

The International Symposium on Electronic Art was conceived in 1988. The subsequent ISEA symposia (Utrecht 1988, Groningen 1990, Sydney 1992, Minneapolis 1993) have been major international meeting points for electronic arts specialists and have displayed a critical and interdisciplinary approach to the problems and potentials of electronic art.

Endorsement
ISEA'94 Helsinki is endorsed by ISEA (The Inter-Society for the Electronic Arts) and ISAST, Leonardo (The International Society for the Arts, Sciences & Technology).

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ISEA'94 is hosted by the University of Art & Design Helsinki UIAH and organized in collaboration with Sibelius-Academy, The Museum of Contemporary Art, MuuMedia-Festival, St. Petersburg Institute, Compu-Café and PopZoo Productions, in association with the Ministry of Education, the Promotion Centre for Audiovisual Culture AVEK, the Finnish Film Foundation and the City of Helsinki.

The Symposium is sponsored by Nokia, Telecom Finland, Silicon Graphics Industries, Apple Computer, Sony Finland, Canon, Radio City, Finnair and Lufthansa. The organizers would like to thank Australia Council, British Council, Centre Culturel Français and Österreichische Botschaft for the generous support.

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welcome

OLLI-PEKKA HEINONEN
Minister of Education

We are immersed in an electronic culture. Intelligent products and media experiences have pervaded our lives and largely influenced a cultural shift, where the distinction between different cultural areas and genres is increasingly harder to make.

This breaking down of boundaries is also reflected in the neologism "edutainment"– a field of interaction between education and entertainment and significant growth area within electronic culture. Computer games, CD-ROM and other forms of interactive multimedia will be crucial to the education of coming generations. The design of these new tools for knowledge requires cooperation between specialists of art, science and technology. The roles of the designer and the educator are of central importance.

Finnish electronic know-how is largely centered on technology, design and theory. The number of electronic artists is also growing day by day, thanks to the range of electronic art and media study programmes launched in Finland at the start of this decade. The multidisciplinary forum of ISEA'94 will contribute to this project and the Symposium will have a long-lasting effect on the development of Finnish electronic culture.

With best wishes for a successful Symposium, the Finnish Ministry of Education warmly welcomes the guests of ISEA'94.

YRJÖ SOTAMAA
Rector, the University of Art and Design Helsinki UIAH

The world we live in is connected – a networked and interfaced reality. Man and machine interact on a scale that reaches from the human body via our living room to outer space. As a consequence of this process human experience is being re-designed by technological means.

The key question in this reshaping of our environment is how the interface with advanced technology is developed and designed. Will technology force us to adopt its functions and aesthetics, or can we promote a human technology, endowed with the gifts of thinking and acting?

These are burning questions at the University of Art and Design UIAH, and specifically in our newly founded UIAH Media Lab, a research center for electronic art and design. Acting at the interface of the fields of art, design, science and technology, UIAH also has strong partnerships with software and computer companies. The same interfacing activity is exemplified by ISEA'94, hosted by UIAH and organized as a large collaboration between Finnish art academies, cultural institutions and industrial corporations. I am sure that ISEA'94 will further strengthen the connections of UIAH within the network of international centers of electronic art and new media.

I would like to express my gratitude to all the institutions and people who have contributed to the realisation of ISEA'94, and I am delighted to have the opportunity to welcome the ISEA'94 participants in Helsinki.

MINNA TARKKA
ISEA´94 Programme director

Introduction

This catalogue is published for ISEA'94, the fifth International Symposium on Electronic Art in Helsinki, August 20-25, 1994. The numerous contributions – essays, abstracts and art projects – draw a profile of the collective consciousness of the worldwide 'electronic art community.'

The ISEA'94 call for participation announced three focus themes – *Spacescapes*, dealing with the re-design of the human experience by technology, *High & Low*, focusing on the histories and oppositions of electronic culture, and *The Next Generation*, looking for emergent forms of intelligence, action and pedagogy.

From the material submitted, distinct sub-themes emerged: statements on *Cyberfeminism*, playing on the gender of technology, and on *Media Archaeology*, appropriating pre-cinematic techniques of the spectacle.

One of the emerging themes can be discerned in the essays of this catalogue: several writers make reference to *Ars Memoria*, a forgotten method of memorizing. Used by orators in the age before print, the art of memory consisted of rooms and things, of imagining a memory space to move in. The method with its vivid images and spatial sequences offers fruitful analogies to today's electronic media – cyberspace navigation, multimedia narrative and the new experience of space in the interactive installations.

It is evident that 'politically correct' concepts, a postmodernist critique of the image and reference to the 'others' of techno-culture have been established in the discourse on electronic art. But after all the conceptual problematics, we are often left with empty hands. A host of pragmatic questions remain: What to do? How to act?

These questions constitute another emerging theme, one that can be read – or sensed – between the lines. And more often than not, the questions deal with the ethical principles of a world that is being dramatically restructured. Tough questions, often only mentioned in passing, as a reminder. This is understandable: in the rush to analyze the aesthetic implications and to make use of the cutting edge applications, even the most critical soul can be lost in an electronic *hybris* or technological determinism.

To formulate the principles for today's electronic space, a next generation of concepts is needed – concepts to act with. I believe that the orators at ISEA'94 will update the art of memory to our electronic age.

I would like to thank all the wonderful people who have contributed to the content and form of the Symposium, and especially Eija Hakala, Sirpa Hemmilä, Tiina Erkinsalo and Mika Tuomola, who made the real-time editing of this catalogue possible.

TROY INNOCENT
IDEA-ON >!   Database of experience

IDEA-ON>! presents the manifestation of fragments of my own personal reality in what appears to be a living, breathing world. The approach to multimedia rejects traditional flat user interface design, and offers the user many different forms of engagement through four "new realities", each prototyping different aesthetic, structural and communication based approaches to virtual space. It is interactivity for interactivity's sake, experimentation with what is possible, experience based as opposed to information based. Things may happen without user interaction, more obscure exploration may be required to find hidden places, or responses given by the objects and beings will vary, often following a surreal kind of logic.

Visiting the IDEA-ON>! installation can be likened to visiting a sacred site where spirits and myths reside. The information space inside the computer becomes a dreaming or meditational space, a manifestation of the subconscious where the objective contents of thoughts are stored for others to explore and experience. Similar in the way pre-linguistic societies would have a shared body of myths and legends which made up their perception of the universe, a world like IDEA-ON>! jumbles together many things towards a prototype of a dreamlike, surreal, communal cyberspace in which people dream, create, imagine, and play with thought and form.

THE QUIET

THE TURN IN THE DARK

NEXT GENERATION
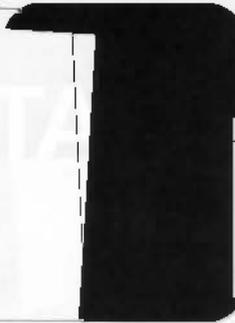
Toward Superlanguage

To read

I am reading, you are reading, you are listening to a text. What is happening? First, the text is perforated, dashed out, strewn all over with blanks. They are the words, the members of the phrases, that we do not see (in both senses of the term, the perceptual and the intellectual.) They are they fragments of the texts that we do not comprehend, that we do not apprehend together, that we do not reunite with others, that we neglect. To the extent that, paradoxically, to read, to listen to, means to begin by neglecting, by misreading, or by untying the text.

At the same time that we tear it apart by the act of reading (or, like now, by listening to it) we *crumple* the text. We fold it upon itself. We bring together passages corresponding to each other. We sew together members scattered, disassembled, dispersed on the surface of the pages, or in the linearity of the discourse: to read a text is to retrace the textile gestures that have given it its name.

The passages of the text keep up a virtual correspondence, almost an epistolary activity that we realize, for better or for worse, following, or not following, the directions of the author. Letter carriers of the text, we travel from one end of the space of significance to the other, assisted by the addressing system, by the pointers, that the author, the editor, the typographer has laid out. But we can also disobey the directions, produce illegitimate folds, weave secret, clandestine nets, make appear other semantic geographies.

Such is the work of reading: this act of tearing apart, of crumpling, of distorting, of putting the text back together, starting from the initial linearity, or platitude, to open up a living milieu where significance may become unravelled. The space of significance does not exist prior to the act of reading. It is by traversing it, by roaming in it, by charting it that we fabricate it.

But while we are bending it upon itself, thus producing its relation to itself, its autonomous life, its semantic aura, we are also relating the text to other texts, to other discourses, to images, to affects, to the immense reservoir pulsating with desires and signs in its totality that constitutes us. Here it is no longer the unity of the text at stake, but the construction of oneself, the construction that always has to be redone, never to be completed. It is no longer the sense of the text occupying us, but the direction and elaboration of our thought, the precision of our picture of the world, the completion of our projects, the evocation of our pleasures, the string of our dreams. This time the text is no longer crumpled, folded into a ball upon itself, but cut out, powderized, distributed, evaluated according to the criteria of a subjectivity giving birth to itself.

Of the text itself there will soon remain nothing. At the most, we may have brought some improvement to our models of the world, thanks to the text. It may only have served us by making some images, some words that we already possessed resound with new depths. Sometimes, we will have joined one of its fragments, invested with a special intensity, to such and such a zone of our mnemonic architecture, another one to such and such a segment of our intellectual networks. It will have functioned as an interface with our selves. It is only very rarely that our reading, our listening, will produce a dramatic reorganization, as if through a violent threshold effect, of the tangle of interwoven representations and emotions constituting us.

To listen to, to look, to read, ultimately all equal with the construction of oneself. Making ourselves open to the effort of signification coming from another, by working, by piercing, by crumpling, by cutting up the text, by incorporating it in us, by destroying it, we contribute to the erection of the landscape of signification inhabiting us. We sometimes confide some fragments of the text to the care of the nomadic tribes of signs journeying in us. These insignia, these relics, these fetishes, or these oracles, have nothing to do with the intentions of the author, or with the living semantic unity of the text, but they contribute to the construction and reconstruction of the world of significations that we are.

Hypertexts

I have not yet pronounced the word "hypertext". And still I have not been talking about anything but the hypertext. Intellectual technologies almost always exteriorize and reify some cognitive function, some mental activity. At the same time they reorganize the intellectual economy, or ecology, in its totality consequently modifying the cognitive function they were only supposed to assist, or to reinforce. The interdependency of writing (an intellectual technology) and memory (a cognitive function) bears witness to it.

The emergence of writing accelerated the process of artificialization and of exteriorization of memory that had undoubtedly began with the first steps of the evolution of man. Its extensive use altered the face of Mnemosyne. We have come to conceive of memories as kinds of recordings.

The semi-objectification of memory by the text has undoubtedly favored the development of a critical tradition. In fact, written documents sever knowledge from its subject. I am no longer what I know, and therefore I may also question what is written.

Writing also promoted the emergence of a system of communication where messages are often both temporally and spatially separated from the source emitting them, and therefore received out of context. Consequently the sophistication of interpretative practices became an obligatory prerequisite for reading. As for the production, one had to imagine systems of self-sufficient enunciations, independent of the context.

With writing, and increasingly so with alphabetical writing and printing, the narrative and ritual forms of knowledge characteristic of oral societies ceded their place to the theoretical and hermeneutical modes of knowledge. The dictate that truth be universal, objective and critical, could only impose itself in a cognitive ecology extensively structured by the written document.

It is known that the first alphabetical texts did not distinguish between words. It was only gradually that the blank spaces between vocables, punctuation, paragraphs and the division into distinct chapters, table of contents, index, the art of lay-out, the reference system of encyclopedies and dictionaries, footnotes... in sum, everything that facilitates the reading and consultation of written documents, were invented. Contributing to fold the texts, to structure them, to articulate them beyond their apparent linearity, these heuristic technologies constitute a system that might well be called an equipment for artificial reading.

Hypertext, hypermedia or the interactive multimedia continue the already ancient process of the artificialization of reading. If reading consists of selecting, of schematizing, of constructing networks of internal references within the text, of associating fragments of texts to other data, of integrating words and images into a personal memory under permanent reconstruction, then hypertextual systems constitute precisely a sort of reification, of exteriorization, of the processes of reading.

By now we have seen that artificial reading has existed for a long time. But how does the system stabilized on the pages of books and journals differ from that being invented today on a numerical basis?

The numerical hypertext automatizes and materializes the operations of reading, and extends its dimensions. Always under reorganization, it provides a reservoir, a dynamic matrix, starting with which the navigator, reader or user, can create a particular text according to the needs of the moment. The data bases, expert systems, tables, hyperdocuments, interactive simulations and other virtual worlds, are potentials for texts, images, sounds, or even tactile qualities, actualized by particular situations in thousands of different ways.

Compared to previous techniques numerization effects a kind of small-scale Copernican revolution: it is no longer the reader following the instructions of reading who moves about in the text, but the now mobile and kaleidoscopic text turning, folding and unfolding itself, manifesting facets of itself in front of the reader, at his prompting.

On the other hand, writing and reading exchange roles. The one who participates in the structuration of the hypertext, outlining possible folds of signification, is already a reader. Symmetrically, the one who actualizes a journey in the documentary reservoir, makes manifest such and such an aspect of it, contributes to the production, momentarily bringing to completion an interminable writing. The seams and splits, the original paths of sense invented by the reader, can be incorporated into the very structure of the corpus. After the invention of the hypertext, every act of reading is a potential act of writing.

But more importantly, hypertextual systems and numerical nets have *deterritorialized* the text. Through them there has emerged a text without distinct borders, without any definable interiority. Now there is text, like one says there is water or sand. The text has been put into movement, it has been taken into a torrent, it has been vectorialized, it has become constant metamorphosis. It is thus closer to the movement of thought itself, or closer to the image of thought that we share today.

The text still subsists but the page has evaporated. The page, i.e. the Latin *pagus* – this field, this territory encircled by white margins, plowed by lines, sown with letters and characters by the author; the page even now heavy with Mesopotamian clay, still adhering to the neolithic soil,

this page of ancient origin is slowly effacing under the growth of informalization as its loosened signs depart to join the numerical stream.

It all happens as if numerization were to establish a sort of immense semantic plane *(cyberspace)*, accessible from everywhere, in the production of which everyone could participate, by folding it differently, by retaking and modifying it, by refolding it... Is it even necessary to stress the point? Today the economic and juridical forms inherited from the preceding periods prevent this movement of deterritorialization from reaching its end.

Aesthetics of Cyberspace

The emergence of cyberspace makes more pressing certain questions that artists have been posing for more than a century. These questions directly modify the "frame": the work and its limits, the conventions of exhibition, reception, reproduction, distribution, interpretation, and the different forms of distinction brought about by them. The modification of the frame is now such that this time it seems that no closure will ever be able to contain in extremis the deterritorialization: we must jump into a new space. The transformation has originated in the socio-technical milieu of the multiplication and distribution of "works". But can we still talk of *works* in the cyberspace?

Already at least for a few centuries the phenomenon called art has passed more or less as follows in the Occident: a person (the artist) signs a particular object or message (the work) that other persons (the receivers, the public, the critics) then perceive, taste, read, interpret, evaluate. Irrespective of the function of the work (be it religious, decorative, subversive...) and its capacity to transcend each and every function toward the substance of mystery and emotion inhabiting us, it is inscribed in the classical scheme of communication. The sender and the receiver are clearly separated, and their mutual tasks prescribed in advance.

But certain artistic experiments have attempted to constitute *agencies of communication* and of production, collective happenings implicating the receivers, transforming interpreters into actors, linking interpretation with collective action, instead of conforming to the scheme where messages are sent toward receivers situated outside of the process of creation and invited to make sense of the work after its completion. Artists experimenting along these lines could well be the first explorers of the new architecture of cyberspace. Their activity matters all the more since it is often consonant with the ethico-political criteria that I wish to announce later on. Shall we soon have to take into account the art and architecture of cyberspace along with the traditional artistic genres?

In this domain even the most "technical" looking of decisions have and will have strong political, economic, and cultural repercussions. We know that architects and urbanists contribute to the production of the material, practical, and even symbolical environment of human groups. Similarly, *those financing, conceiving and engineering cyberspaces contribute to the production of environments of thought* (sign systems, intellectual technologies), of perception (interfaces), *of action* (telework, teleoperation), *and of communication* (rights of access, tariff policies) *that will structure social and cultural evolutions to a large extent.*

To guide in the construction of the cyberspace, to assist in the selection between different orientations that are possible, even to imagine new ones, I propose criteria based on ethico-political selectivity, an organizing vision. Systems contributing to the production of a collective intelligence or imagination should be encouraged. Evidently, collective imagination is not be understood as a fusion of the individual intelligences into a kind of amorphic magm, but, on the contrary, as a process of growth, of differentiation, of proliferation and of mutual rebound of singularities. The concept of collective intelligence refers to intelligences distributed everywhere, active everywhere, valorized everywhere, coordinated and placed into synergy. In my mind, that is the best use the cyberspace can be put into.Following from this general principle, one should select foremost...

1) instruments favoring the development of *the social bond through learning* and the exchange of knowledge,

2) agencies of communication suited for listening, for the integration and re-establishment of diversity rather than agencies replicating the traditional distributive strategies of the media,

3) systems having as their goal the emergence of *autonomous* beings irrespective of the nature of the systems (pedagogic, artistic, etc.) and of the beings (individuals, human groups, works of art, artificial beings).

Dynamic Ideography

Interpretation, i.e. the production of sense, no longer refers to the interiority of an intention, or to the hierarchies of esoteric significations, but to the appropriation of the navigator in its singularity. Meaning is based on local pertinence, it emerges at the intersection of the deterritorialized semiotic plane and the search for efficacy, or for pleasure. I am no longer interested in the thoughts of an unattainable author, what I ask of the text is that it make *me* think, here and now.

This is where we arrive at the limit of the notions of text and of reading.

In order to cross the border, to try to understand what is at play beyond the border, I suggest that we make a mental experiment. Suppose that we would not yet have invented writing, but that the extra-terrestrials would have placed all the media of contemporary communication at our disposal, including the dynamic, interactive technique possessing memory and autonomous calculating capacities that makes up the screen of the computer. The extra-terrestrials suggest that we invent a system of signs in order to help us think and make records of our thoughts. What kind of writing should we set up under these circumstances? Would it be alphabetical? Certainly not, since the alphabet – vowels and consonants – is *grosso modo* a system for the notation of sounds, and since we already have at our disposal a multitude of devices for the recording and restoration of human voice. What would we profit by spending years and years in order to learn a visual system for the notation of sounds, when we can already arrest and reproduce them, and, thanks to the numeric addressing system, navigate in the sonorous material as we desire. The alphabet was invented at a time when the magnetophone did not exist. In the antiquity and the middle ages alphabetical texts were used almost like magnetic tapes because men had to read aloud and to hear the sound in order to get the meaning.

But writing does not necessarily have to based on the faithful inscription of the sounds of our speech in order to notate *thought,* as is made evident by Chinese ideograms. A form of writing may be completely independent of spoken languages as is shown by Arabic numerals and by mathematical notation in general.

Coming back to our imaginary experiment, it is clear that the extra-terrestrials are suggesting that we invent a form of writing, a system of signs, an intellectual technology, which does not merely duplicate what is already being done by the media founded on the immediate capture of pictures and sounds, but would exploit all the possibilities opened up by interactive graphic screens, even by the multimodal, three-dimensional, virtual realities.

The majority of sign-systems – alphabetical, ideographic, mixed, and others – known today have been invented when there were only static, fixed, technical materials available. It should be noted that contemporary multimedia or hyperdocuments are often contented with the re-appropriation of signs invented for other techniques (different forms of writing, static maps or schemes, video images, sound recordings) and with their netting. They organize new navigations in an ancient semiotic reservoir. They deterritorialize a stock of signs already available. There is nothing astonishing in it, since the new interactive techniques emerged from laboratories less than a decade ago, and have does existed socially in an efficient way for less than ten years. Ten years! It is next to nothing on the scale of cultural evolution, much less than is needed for a civilization to invent a new form of writing, and to refashion its system for the communication, the production and the transmission of knowledge at the same time.

The interactive multimedia based on numerical techniques explicitly pose the question of the end of logocentrism, of the demolition of a certain supremacy of the discourse over other modes of communication. It is probable that the human language appeared simultaneously in different forms: oral, gesticulative, musical, iconic, plastic, with each of these singular modes of expression activating such and such a zone of the semiotic continuity, reverberating from one language to another, from one sense to another, following the rhizoma of signification, attaining to the mental capacities even better as they traversed the body and the affects. The systems of domination that were founded on writing isolated language, making it the master of a semiotic territory from then on set apart, parcelled out, judged according to the exigencies of the sovereign logos.

The apparition of hypermedia sketches out an interesting possibility (among others that are not so appealing): the possibility of retracing the path opened up by writing but in the adverse direction, beyond the triumph of logocentrism, toward the reopening of a deterritorialized semiotic plane. But it means to return to the paleolithic age with all the powers of the text, armed with instruments then unknown, instruments capable of making living signs.

Rather than staying emprisoned in the facile opposition between the reasonable text and the fascinating image, should we not make an effort to explore the richer, more subtle, more sophisticated possibilities of thought and expression opened up virtual worlds, multi-modal simulations, the dynamic techniques of writing?

We already have under our eyes, at the two opposing extremes of our cultural hierarchy, the premises of the new writing.

In the domain of scientific research numerical models of phenomena are visualized on screens. Interactive graphic simulations have become indispensable instruments of the imagination assisted by computers. Neither belonging to experimentation, nor to theory, simulation - industrially producable experiment of thought – has opened up a third way of discovery and learning, unknown to the epistemologists. The numerical model, unfolding its dynamic image on the screen, still derives from a form of writing, but certainly not from the notation of speech. It does not notate sound: it notates mental models. And like the mental model it is interactive, explorable, mobile, modifiable, branching out into thousands of reservoirs of data.

On the other side of the cultural scale video-games also offer interactive models for exploration by simulating landscapes of adventure and imaginary universes. True, it is shere entertainment. But it is difficult not to be impressed by the coincidence of the two extremes: the researcher multiplying scenarios by the exploration of numerical models and the child playing video-games are both experimenting with tomorrow's writing, with the language of interactive images, with the dynamic ideography permitting the simulation of worlds.

Rather than to condamn video-games the humanists and the pedagogues, the creators and the authors, should grasp the possibilities of the new writing, and create works worthy of the name, invent new forms of knowledge and experimentation equalling with its possibilities, making it earn its spurs. No situation could be worse than that in which the cultured men and women isolate themselves in the territory of the alphabetical text and leave the language of tomorrow into the hands of technicians and salesmen. Separation almost always brings about barbarism.

So there exists a form of knowledge by simulation, very different from the theoretical and hermeneutical styles relying on static writing. Its principal criteria are undoubtedly no longer those of the critical, the universal, and the objective truth, but rather those relating to the potential for bifurcation and for variation, to the capacity to be altered, to operationality, to local and contextual pertinence. In fact, the contemporary means of communication have inaugurated an economy of messages very different from the one that prevailed until the middle of the 20th century. One certainly cannot bathe twice in the same stream of information, but the density of connections and the rapidity of circulation are such that the actors of communication have no great difficulty in sharing the same context. Consequently, the demand for universality and for objectivity has diminished. As McLuhan predicted, we are returning to some of the conditions of communication reigning in oral societies but on a different orbit, on a level of superior energy.

The relations to knowledge

The history of the interdependency of material techniques and conceptions of knowledge could be schematically represented by four ideal types, their interferences and intersections.

First type: in the societies existing before the invention of writing the practical, the mythical, and the ritual knowledge was embodied in the living community. As an old man dies a library burns.

Second type: with the advent of writing knowledge is transmitted by *the Book*. The one, indefinitely interpretable, transcendent book, believed to contain everything: the Bible, the Koran, the sacred texts, the classics, Confucius, Aristotle...

Third type, beginning with the invention of printing and prevailing until this morning: characterized by the encyclopedia. Here, knowledge is no longer transmitted by the book but by the library. It is structured by a network of references, as if haunted by the hypertext from the very beginning.

The deterritorialization of the library that we are witnessing today is perhaps nothing but a prelude to the emergence of a fourth type of connection with knowledge. Through a kind of spiralling return to the orality of origins, knowledge could once again be carried by living human collectivities rather than by separate material bases. With the difference that this time the immediate carrier of knowledge would no longer be the physical community with its carnal memory but *cyberspace*, the region of virtual worlds through the intermedia-

tion of which this community would recognize its objects, and itself as a collective intelligence.

Here I no longer speak of the future of the classical text as I did in the first part of the discourse, or of the invention of a new form of writing as in the second part, but of the gravitation towards an entirely different ecology of communication.

The fusion of numerical documents, of intelligent software, of systems of information bases, of techniques of simulation and of interactive multimedia is already virtually realized by the world-wide interconnection of computer memories. Electronic mailing services construct a network of international communication where all sorts of data may be exchanged and commented. But how is one to orient oneself in this cyberspace where messages and data of every kind flow? How is one to find a fixed point in a torrent? Must one desperately try to freeze the form of the knowing space, to draw frontiers between disciplines? Must it be divided into hierarchies of the essential and the auxiliary? Judging by what criteria? For the benefit of whom and for how long?

Should we not rather make up our minds to consider knowledge a continuous and pulsating space, the same for all and different for everyone? Why not imagine a galaxy of virtual worlds giving expression to the diversity of human knowledge, a galaxy that would not be organized *a priori* but would, on the contrary, reflect the trajectories and the uses made of it by its explorers. Almost living, these cosmopedies[1] would be structured and restructured, charted and recharted in real time by the collective act of writing and reading.

Thus, the cyberspace of a community would automatically reorganize itself reflecting the mobile relation of its members to the mass of information at their disposal. As soon as an individual plunges into a cosmopedia the whole space of knowledge restructures itself around him or her, mirroring his personal history, his interests, his investigations, his earlier enunciations. Everything that concerns him would envelope him coming as close to him as possible, installing itself within the reach of his arm. Would grow more distant that which is not important for him. Distances would be subjective in it. Proximities would be functions of the contextual significances.

The cosmopedies of the 21st century will no longer make people turn around knowledge but knowledge around people. The system of trees of knowledge[2], already now technically available, prefigures this project.

Up to now one has mainly envisaged virtual realities simulating physical spaces. But here I speak of the production of symbolic spaces in the form of virtual worlds expressing significations and kinds of knowledge characteristic of a collectivity. These virtual worlds would express the interests, the kinds of knowledge, the acts of communication of the collectivity in real time, with the direct involvement and the tactile component suggested by the word.

From the perspective of the virtual worlds of shared significations, communication is no longer conceived of as distribution of messages, exchange of information, but as the continuous emergence of a collective intelligence.

Numerical instruments offer the possibility of an evolution toward greater democracy in the relation to knowledge. But nothing is guaranteed. At the moment when everyone recognizes that knowledge is at the foundation of power, when it is repeated everywhere than the capacity for learning and for inventing sustains the economic power, there is perhaps no other way for the renewal of democracy than to imagine and realize non-exclusive forms of relation to knowledge.

It is to reach this end that I propose the utopies of the dynamic ideography, the cosmopedia, the trees of knowledges, virtual worlds of shared significance, the cyberspace for the collective intelligence to your critical sense.

If ever such possibilities see the light of the day, then the Book, the library, the immense proliferating and crazed corpus of knowledge would cease to hang above our heads and to confound us. The transcendence of the text would begin to wane. We would perhaps be less irradiated by the spectacle of media. The immanence of knowledge in the humanity producing and utilizing it, the immanence of people in texts, would become more visible. By the intermediacy of virtual spaces giving expression to them human collectives would surrender to an effervescent writing, to a process of reading inventing them and their worlds.

Like some participants in the demonstrations of this end of the century who have shouted in the streets: "we are the people", we will also be able to pronounce a somewhat bizarre phrase, a phrase that will resound with the totality of its significance when our bodies of knowledge will inhabit the cyberspace: "we are the text". And our freedom will be greater the more we become the living text.

[1] See "La cosmopédie, une utopie hypervisuelle" in collaboration with Michel Authier, in Culture, Technique no 24, April 1992, dedicated to 'communicative machines, p236-244.

[2] Its description is to be found in the book by Michel Authier and Pierre Lévy, prefaced by Michel Serres, Les Arbres de connaissance, La Découverte, Paris, 1993.

THE NEXT GENERATION

Re-membering in time and space

The knowledge of individuals is fragmented. Human intelligence is dispersed in space. It unfolds in a discontinuous time, broken by eclipses. The collective intellectuality will effect its unification, its re-membering. It constructs a transpersonal and continuous thought. A cogitation that is anonymous but perpetually living, irrigated everywhere, in constant metamorphosis. By the intermediacy of virtual worlds we can not only exchange information but also truly think together, put together our memories and our projects to produce a co-operative brain.

It is true that communicative media already have established a continuity in time and space: telephone, fax, electronic mail, numerical and telematic networks, radio, television, the press, etc. This continuity is still not the continuity of the active and living thought, singular and differentiated, emergent and cohering everywhere, but rather a network for the transportation of information. Do the viewers of a televised transmission share a community? Do they bring together their experiences and their intellectual powers? Do they envisage and perfect new mental models of a situation together? Do they even exchange arguments? No. Their brains are not yet cooperating. The continuity effected by the media is only physical. It is a necessary prerequisite of the intellectual continuity but not sufficient in itself.

Until this morning the work of writing was undoubtedly one of the most efficient means for the production of collective thought ever invented. The network of libraries keeps records of the creation and the experience of myriads of dead and living human beings. The fragile filament of memory is re-established, dormant thoughts revivified from generation to generation through the processes of reading and of interpreting. Translations from one language to another, or from one discipline to another, assure the communication between detached spaces of thought.

But by its nature the classical form of writing is a static and discontinuous system of signs. It is an inert, parcelled, dispersed body becoming more and more enormous each moment, and its unification and resuscitation requires that each individual sacrifice years and years to research, interpretation to the establishment of connections.

As a remedy to the present situation, virtual worlds of collective intelligence will see the development of new forms of writing: animated pictograms, moving languages that will preserve traces of their interaction with navigators. By itself, the collective memory will organize itself, unfold itself anew for each navigator according to his interests and his previous traversings of the virtual world. The new space of signs will be sensitive, active, intelligent, at the service of its explorers.

I ask again: what is interpretation? The subtle mind attempting to invite the inert body of letters into a dance. The evocation of the breath of the author in front of dead signs. The haphazard reconstruction of the knot of affects and of images in which the text originates. And, finally, the production of a new text, that of the interpreter.

But what if the signs are alive? What if the image-text or the space-thought continuously grows, proliferates and metamorphoses itself to the beat of the collective intelligence? What if the leaden characters cede their place to some dynamic and translucent substance? What if the opacity of the gigantic stratifications of texts effaces itself in front of a flowing and continuous milieu the center of which is always occupied by its explorer?

After the encounter between the vivifying spirit and the dead letter, after the dialectic of the corpus and the oral tradition, comes a new mode of the construction of the continuity of thought, a mode making possible the participation of everyone in the adventure of a nomadic language.

The new nomadicity and the superlanguage

The first nomadic people followed after their flocks searching for nourishment, moving about following the rhytm of seasons and of rains. Today we are nomads following after the future of humanity, the future traversing us and made by us. The human being has become its own climate, an endless season with no return. We are hord and flock intermingled, more and more attached to our instruments and to the world moving with us, strolling on a new steppe each day.

Neanderthal men, well adapted to the wonderful hunting expeditions on the glacial tundra, became extinct when the climate abruptly became warmer and more humid. Their natural game disappeared. Despite their intelligence these growling or mute men had no voice, no language with which to communicate with each other. Therefore the solutions found for their problems here and there could not be made more general. They remained

dispersed even when they were faced by the transformation of the world surrounding them. They did not change with it.

Today the *homo sapiens* is face to face with a fast modification of its surroundings, a transformation of which it is the collective involuntary agent.

We may either cross a new threshold, a new stage in the evolution of man, by inventing some attribute of humanity as essential as language but on a superior level. Or we may continue to "communicate" through the media and to think in institutions detached from one another, organizing moreover the suffocation and division of intelligences. In the second case the only problems we would still be confronting would be problems of survival and of power. But if we were to take the route of the collective intelligence, we would gradually invent techniques, systems of signs, social forms of organization and of regulation permitting us to think together, to concentrate our intellectual and mental power, to multiply our imaginations and our experiences, to work out practical solutions for the complex problems affronting us in real time and on all levels. We would progressively learn to orientate ourselves in a new cosmos, constantly transforming itself and drifting, to become its authors as much as we can, to invent collectively ourselves as a species. Collective intelligence does not aim at the mastery of selves through human collectives but at an essential loosening of the grip changing the very conception of identity, the mechanisms of domination and of the breaking out of conflicts, the unblocking of confiscated communication, the mutual launching of isolated thoughts.

So we are now in the same situation as a species whose each member would possess a good memory, would be perceptive and astute, but which would not yet have reached the stage of the collective intelligence of the culture because it would not have been capable of inventing an articulated language. How can one invent language if one has never spoken, if one's ancestors have never pronounced a single phrase, if one has no example to follow, not the slightest idea of what language could be? We are as nearly as possible in the same situation presently: we do not know what it is that we have to create, what we may already have obscurely began to envision. Still it only took a few millenia for the homo habilis to become the homo sapiens, to cross such an imposing threshold; it launched itself in the unknown, inventing the earth, the gods, and the endless world of signification.

But languages are made for the "human scale" communication within small communities, perhaps even to guarantee the stability of their relations. Thanks to writing we have reached a new stage. The technique of writing effected the growth of the efficiency of communication and the organization of human groups; its scope was much wider than could ever have been that of shere speech. But this change took place at the expense of the unity of societies: it caused the division of societies into bureaucratic machineries for the handling and manipulation of information with the aid of writing and into those to be "administered". The task of the collective intelligence is to discover, or to invent, the other side of writing, the other side of language, so that the manipulation of information would be distributed everywhere, coordinated everywhere, that it would no longer be the priviledge of separate social organs but, on the contrary, would be naturally integrated into every human activity, as a tool in the hands of everyone. This new dimension of communication should evidently permit the mutuality of our knowledge and the reciprocality of its transmission which is the most rudimentary condition of the collective intelligence.

In addition it would open up two major possibilities that would radically transform the fundamental facts of life within societies. First, we would have at our disposal simple and practical means of finding out what it is that we are doing together. Second, we could handle, even more easily than we write today, instruments allowing collective enunciation. And all of this no longer on the scale of paleolithic clans, or on that of States and historical institutions, but with the amplitude and velocity of gigantic turbulences, of deterritorialized processes, and of anthropological nomadism influencing us today. If our societies content themselves with mere intelligent government, they will almost certainly not attain to goals set by them. In order to have some chances of a better life, they will have to become intelligent by the masses. From beyond the media aerial machineries will make the voice of the multiplicity heard. It is still indiscernible, muffled by the mists of the future, bathing another kind of humanity in its murmur, but we are destined for an encounter with superlanguage.

(translated from the French by Riikka Stewen)
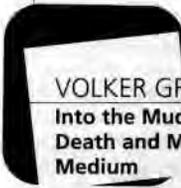
VOLKER GRASSMUCK

Into the Muddy Waters of the Turing Galaxy
Death and Metaphoric Rebirth of the World in Media and of Media in the Universal Medium

Strange enough, with such an apparent distance between the media worlds of the ancient Romans and ours, a central idea for artificial storage corresponds across the ages. Although in the meantime major paradigm shifts have taken place, and two new 'galaxies' have emerged - that of Gutenberg and that of Turing - not only some vague anthropological constant, but a worked-out concept of a memorizing technique survives, even though in quite a different format. The Greeks had made an art of it, and it is still known as 'mnemonics' today: the idea of using *loci* and *imagines agentes* (places and active vivid images) for dynamic, active storage of *res* and *verba* (things and words).[1] The idea of rooms is basic to most computer games consisting of connected rooms or screens, and each is associated with things to see and do there. The same kind of spatial interface metaphor appears again in the network in the form of MUDs (Multi-User Dungeons), and here we also find back 'vivid agents'. That this 'world simulation' could be at the base of a social, action-oriented, experiential interface to the Matrix is the main idea of this paper.

Gutenberg Galaxy

"The urge to record observed experiences, and the techniques and materials for such recording occurred much earlier than other marks of civilization."[2] These artifacts constitute a realm of external symbolic storage. Information became independent of a living human memory, and transportable in space and time. Over a distance of 17,000 years, the images in the caves of Lascaux still speak to us today. Mathematical and lingual notation allowed humans to form, express, and communicate their ideas on the stars, the world and each other.

The 'media horizon' expanded radically with the invention of print. The Gutenberg Galaxy [3] introduced the whole range of typographic elements and operations that every literate person today takes for granted. Whereas the earliest printed books resembled medieval manuscripts, Aldus Manutius' invention of the pocket edition for mass dissemination of Greek and Roman classics marked a breaking point. The printed book started to create its own media format, which eventually formatted society by making mass-literacy possible. Aesthetic elements like the two type faces Roman and *Italic* on which nearly all Western types have been based to this day were also introduced in Renaissance Italy. At the same time the title-page appeared as the place to inscribe an author-subject. To allow a reader/writer to operate inside the media horizon of print, search tools like pagination, index, footnotes, were introduced, the latter hyperlinking the reader from the book at hand to the complete text corpus of the library, turning books into hypertexts *avant la lettre* (Norman Bolz).

The Gutenberg Galaxy is made up of words that have meaning, which in turn are made up of letters that do not. Arranging the symbolic world in a meaningless alphabetical order allowed two important operations of the Gutenberg Galaxy - keyword searches and browsing. The idea behind Archie or Veronica (as, of course, behind every text database) is strictly Gutenbergian - not Turingian. For terminological, if not yet technical, operations on signifiers themselves rather than on texts, typographic operators like the quotation mark were introduced. These operations prepare the ground for the 'take-off of the signs' (Kittler) that will lead us into the Turing Galaxy.

A final aspect of the Gutenberg Galaxy needs to be mentioned. The library is permanent, ie. permanently growing (4). It does not dispose of a system of elimination, no 'structural amnesia'. Where the knowledge horizon of the *ars memoria* and of the manuscript could be reshuffled by each speaker and writer, an author today is drifting on a sea of print and - if she adheres to the rules of literacy - has to sink anchors into it without hoping to ever reach ground.

Technical media

Technical media break the monopoly of the book, and again radically re-format world and man. While all previous media relied on the human mind to pre-process what was mediatized,

technical (input) media record sound and light directly without human intervention beyond the operation of selection

The price for this is that the format in which data are produced, stored, transmitted, and received is not directly readable by human senses anymore. Technical media use a decoding machine to read, for example, the holes in Jaquard's punched card or the bumps on Edison's tinfoil.

The advantage on the other hand, is that these submicroscopic data can be transmitted without material movement in space and therefore without human accompaniment. Non-technical media are bound to a physical carrier, they require the same network infrastructure as traffic of people and goods. The earliest wire networks had a point-to-point structure, requiring access points for in- and output, relay or refresher stations at regular intervals, and central nodes where messages are switched to their destination.

In 1896, Marconi's wireless telegraphy extended the traffic of signals into the ethereal radio spectrum. The point-to-point cable was supplemented by omnipresent waves that can be intercepted by anyone owning a receiver. Radio extended the distance the voice carries virtually around the globe. With the broadcast networks of radio and TV, the center-to- all structure was invented. One speaks and all listen. These media are an extension of the public sphere, and therefore the radio spectrum is usually considered a public resource and regulated accordingly. Broadcast media create the masses they address, synchronizing millions of non-present, anonymous media recipients.

McLuhan points to the origin of technical media in the medium print. In contrast to his own interpretation of the electronic media as fundamentally different from print, in their homogenizing function they are not. Reading this quote against its author, I see the program of 'homogenization of men and materials' rising to its ultimate violent power only in its military form under conditions of mass- mobilization during the Second World War (radio), and in its postwar civilian form under conditions of mass-markets, -media, -automobilization, -tourism etc. (TV).

One further important aspect of technical media is that perception of the world shifted from the real thing to its stored mediatizations. Typists took dictation not from their superior's voice but from a gramophone or telegraphone recording. The question if Leland Stanford's horse had all four feet off the ground when in gallop could not be answered by observation through the naked eye, but Muybridge's serial photographs showed that it was in fact the case. The amount of live music we listen to is neglectable in comparison to pre-recorded music. Whereas live broadcast implies a co-existence in time, a simultaneity that seems to warrant authenticity, much of what we see on TV is pre-recorded, edited, re-run - if we are not watching out of local storage of video anyway. Personal communication shifted from synchronous to asynchronous with the storage of answering machines, faxes, and email. The Matrix itself is a vast and rapidly growing library.

In short, large and exponentially growing parts of our media horizon are 'canned', and the two essential new operations besides transmission that technical media add to those of the Gutenberg Galaxy - copying and editing - are based on storage media.

Turing Galaxy

The history of the *ars memoria* ends with Leibniz, writes Yates. May we add that with him also begins the history of autonomization of external memory, its mathematization and mecha-nization - the pre-history of the computer that continues via Babbage and Lovelace to Turing and von Neuman. Leibniz' *ars combinatoria* takes the place of the *ars memoria*. Or in the phrasing of Lyotard: with the virtually complete knowledge in store, the problem becomes one of creating new, surprising recombinations. Maybe we can see a common theme in the quest for the Universal Key *(ars memoria)*, that turns into one for the Universal Script (Leibniz), and finally into the Universal Machine (Turing), and the Universal Communication System (Shannon).

A technological innovation fundamental to the Turing Galaxy preceded Leibniz by nearly a thousand years, the mechanical clock. All symbol systems from the earliest cuneiform on are digital. All observable phenomena in the world exist in time and are therefore analog: the flow of water, movement of stars, aging of man, human speech. The first analog-to-digital conversion occurred with the mechanic clock. It inscribed, if not yet with a high precision, a digital structure into time, creating an 'artificial time' that does not exist outside the

operation of the machine generating it. This artificial digital time is a means for synchronization of technical media, whether it is the clock rate of a computer or the time code of a video editing machine.

The computer has its roots in mathematics which is indistinguishably linked to astronomy. Computing machines were built before Leibniz, like Schickhard's calculating clock (!) (1624) or Pascal's adding machine (1642). Still the primacy goes to Leibniz who produced a great confluence of streams of ideas, and contributed profoundly to symbolic logic, combinatorics, and therefore the history of the computer.

Babbage should at least be mentioned in passing. His projected Analytical Engine was to have included most of the characteristics of modern computers realized only a hundred years later: a store, a mill (CPU), a transfer system, in- and output, and he also anticipated automatic operation, external data memories, conditional operations and programming.

In 1847, Boole used a binary notation to represent truth-values in formal logic, 0 and 1 representing 'false' and 'true'. Shannon and Weaver's information theory translated the Boolean false and true into off and on states in electronic components. Signals, since this ultimate analytic cut with Ockham's razor, fall apart into basic indivisible yes/no units called bit. Like 'atom' for the material world and 'individuum' for society (both meaning 'indivisible'), 'bit' marks the smallest possible unit, the simplest building block of any possible symbolic system.

Having mentioned some of the shoulders he was standing on, I can now turn to Alan Turing. I suggest to name the emerging horizon of binary digital media "Turing Galaxy", because its two central concepts were first formulated by him. One is the Universal Machine, the extremely primitive machine that can emulate any machine, the typewriter that reads and writes an operative text out of no more than two characters which freely models the appearance of the typewriter itself, the Universal Medium that precedes and empowers any possible multimedia to come.

From then on every phenomenon and every process that can be described completely and unequivocally (the definition of both algorithm/automaton and the inter-subjectively scrutinizable knowledge of science) can be implemented in the one single machine to end all machines. The problem of building new machines has been replaced by the problem of writing an operational description of this new machine for the universal machine. (5)

The other is the thought experiment known as the Turing Test which provided a comprehensive re-definition of man as a symbol processing system on a par with machines, and technically resolved the subjectivity problem. (6) Since then, 'intelligent' modelling, signal processing, and pattern recognition - so called thinking - has turned into a continuum across a range of possible technical or biological implementations. 'Mind' and machine have become interconnectable (if not interchangeable).

Turing or bit media inherit properties from earlier media. They still operate largely in the mind-frame of the mathematical and the Gutenberg Galaxy. The most essential new operation introduced in the Turing Galaxy seems to me simulation. While models in the Gutenberg Galaxy become operational only after being read into and processed by the cortical CPU, models in the Turing Galaxy run inside a dynamic self-active technical medium. Bit words have the double function of addressing human readers as well as machines, i.e. themselves. Action unfolds and changes according to a script or in response to the action of the user and to its own results. Simulation allows to test hypotheses, to automatically control real life processes, and to construct alternate worlds.

Today we observe the collapsing of all media into the universal medium computer. Turing media connect people, libraries, machines, and aartificial communicational entities. We are still exploring what the usage of computers in 'Turing mode' could mean. My suggestion: acting inside of media, and interacting with artificial agents.

Action/Interaction and Game/Play

In order to comprehend, we have to act upon objects and others, not only passively perceive them. Whether in a material or in a symbolic realm, praxis involves an exchange with others, and with the objects in question and their specific resistance. Selection is a consumerist way of relating to an offered range of choices. Action is a productive/creative way of relating to a given environment. It involves producing changes and being changed, not only making choices.

The mass-distribution media function to achieve the re-construction of world and man in a kind of 'original accumulation of symbolic capital', transposing parts of the world into media and linking the individual to them, creating access points to each and everyone. The Universal Simulator goes beyond pre-bit technical media in that it can simulate spaces - idea spaces and perspective, Cartesian spaces (just as easily, of course, as any other imaginable space). If signs and 2D images map onto the eye, and sound onto the ear, space maps onto the (kinesthetic) body. Technical media dissolve the dimensions of space and time, which are the coordinate systems in which the physical body exists, and they do so experientially, not only philosophically. The Universal Simulator reintroduces these space-time coordinates inside the media horizon. Media-logically and historically, the first phase of connection and selection is followed by the introduction of action inside the media.

The early batch processing of punched cards can be seen as interactive only in a very indirect sense. Action not as inputting data and reading the output hours or days later, but as a dynamic realtime feedback process began with simulators and games. It was not by chance that when in 1962, hackers at MIT had for the first time a minicomputer connected to a CRT display at their disposal, they decided that "naturally the obvious thing to do" was Spacewar. Laurel's explanation for this 'naturalness' was that they understood the computer's essential new "capacity to *represent action in which humans could participate*"(Brenda Laurel).

Exactly two decades later, when computers first reached popular culture, they did so in the form of computer games. Games are simulations. In the earliest form they simulate rules and strategies of board games. Later they simulate technical systems (notably with the military flight simulator reappearing as entertainment product), and social systems (role playing games, SimCity etc.). In games (as in simulation) the computer takes on the function of agency, of a counter- player, an interlocutor, simulating dragons, enemy aliens, humans, governments, or simply fate. The computer also provides the playing-space into which the human player projects herself as a sprite, avatar, or persona, a marionette of herrself that she flies by the wire of the joystick. This is the first time not only the eye and ear, but the hand reaches through to the other side of the proverbial looking glass.

With the emergence of data networks, games shifted from single-player stand-alone games to multi-player networked games or MUDs (Multi-User Dungeons/Dimensions). Here human others are re-introduced into the position of counter-player, next to and on a par with pieces of software simulating game characters. Originally games in the narrow sense of the word built around the sword-wielding-and-monster-slaying world of Dungeons & Dragons, MUDs are developing into common meeting grounds around diverse topics including professional conferencing facilities and educational institutions.

Interfaces

To sum up: The Computer has four roots. One is mathematical. One is lingual. One is technical. Since I see the network not as something exterior to what the computer is (just as the library is not exterior to the medium book), a fourth root is in networks.

he computer is social. This is not a distinct 'root'. Math, language, technology, and networks are, of course, all in themselves social, like every artefact. Nevertheless I find it useful to apply a separate viewpoint of the Matrix as a whole as a technically mediated form of the social. As *technology* it sets specific conditions. But as *communication* it is not absorbed into the realm of techno-logic. The networked computer retains the quality of a communicational milieu which is the basis for social acts, eg. that of constructing communities - the same act that takes place face-to-face in a bar, a conference, or a club meeting. Also the language games within the natural horizon and those in the media horizon - games of power, commerce, recognition, seduction, play - are not that much different. How could they be? A last aspect of the computer that I would like to emphasize is simulation. Again, mathematics, language, technology also 'simulate' something other than themselves. Maybe one could even say that all other forms of network simulate the earliest, the original one - walking on the dream-paths of the Ancestors with song as a map (Bruce Chatwin). But the Universal Medium is one meta-level up. Additionally to something putatively real it simulates all the other medial simulators.

These four roots and two aspects will not simply evaporate with the arrival of a new hype(r) medium. None of them will disappear,[7] but all will get a new face.

The interface is the visible 'tangible' surface of media, the nexus point or gateway between man and media, i.e. the world. Therefore it is its single most important aspect deserving the most attention. Because the interface links two systems with quite different specifications, operations and dimensions, it has a characteristic Janus face in both directions, standing with one foot on each side of the boundary, so to speak. In the early days, men interacting with computers had to adhere to its specifications (eg. program in machine code). Since then, layer upon layer was constructed around the computer to translate its inner workings into more human-dimensioned forms. The bit media turn into interaction partners on human's terms.

Gutenbergian Interfaces

A typical host on the Matrix has a tree structure. It might be presented as a directory listing, menu, or in an index file pointing to the individual texts. One might browse or search by keywords with the search space inside one database, one host, or network-wide. At the final nodes of the tree one might find a text, in itself complete with author, pagination, footnotes, etc.

The Gutenbergian resources on the Matrix are vast. Librarians were among the first to inhabit and develop it. Just a few examples are the US Library of Congress, including their Soviet and Vatican online archives, the Project Gutenberg, books.com, the first bookstore on the Net, magazines like Wired, and a sprouting new category of multimedia Metazines like the Electric Eclectic. Do people actually read books on the screen? Do they print them out? How are etexts used? The advantage of having reference books ready for automatic searches is obvious. Same for checking quotes in any sort of text. Maybe people will start to actually read electronic books when screens are light enough to hold, as pleasant to the eye and as 'interactive' as print on paper. Maybe people will have them rread to them by a voice synthesizer. Already now, the ASCII text is driving a Braille interface to allow blind people to read them.

But rather than looking at the 'usage' of an individual text it is apparent that 'reading' will take on a different meaning when you imagine a library of 10,000 etexts in the form of a single text corpus available to you at any time. Even though somebody like Borges might be able to store a huge library in his memory and quote from it literally even after going blind, this is not given to most of us mortals. But thanks to the automatized external memory, we have random access to all the stored ideas. We can keyword search, browse with guaranteed serendipity effects, follow through on various threads, all the while creating hyperlinks on the go, leaving tracks inside the Gutenberg horizon that we can follow again next time we touch any of the texts. Every work (say Dante's Divine Comedy (8) appears in its own context, and in any other that we might create.

All these operations could be done inside a library, but involving a lot more foot-work. The increased accessibility is already more than a quantitative difference. But what other automatic operations on texts may emerge, most of all what the new faculty of simulation will mean for writing/reading, ie. 'thinking' under conditions of the availability of the virtually complete library (Lyotard) in a dynamic format at the tick of a few keys, will have to be seen.

If all these operations have to be done using raw Unix commands or exotic database query languages, the bookish Gutenbergian will likely not feel very at home. Luckily, there have emerged hypertext interfaces that make life a lot easier (World Wide Web under Mosaic). The reader/writer sees a text page complete with graphic design, that can be read like the page of a book. The reader can mouse-click his way around in the labyrinth of the global online library, make annotations, leave 'bookmarks' etc. A special feature is that the 'footnotes' to materials (text, image, sound, and video) outside the present text are active. By clicking on them, the corresponding file is retrieved across the Matrix, and presented immediately. All these are Gutenbergian operations, accelerated to the speed of electricity. Their model is the library.

Network Interfaces

The individual network media move into the Universal Medium (like the animals into Noah's ark?) in their historic order.

The Letter. Postal mail is basically a point-to-point network, switched (sorted) at post offices, transported by diverse means of transportation. 'Snail Mail', as it is called in net.land, is usually private, to someone you know, but it can be extended to point-to-many. Mailing lists exist also in RL for commercial, administrative or grass roots usage, but switching from traffic to transmission is more than a linear change. The Universal Network Medium adds the function of a reflector. A list server (like Majordomus) is an automatic forwarding program that sends every incoming message on to every subscriber, and drops it into his mailbox. Mailing lists can be unmoderated, ie. the information is provided as is, or moderated, ie. pre-processed by a wetware editor agent, which for certain purposes helps to raise the information-to-noise ratio significantly. Whether it holds together a professional special interest group, a hobby club or a speaker's ccorner - the mailing list constitutes a form of public.

Electronic fora or bulletin boards - the metaphors reveal the heritage of earlier equivalents in public face-to-face real space. The most impressive are, without doubt, the Usenet newsgroups. Forming another network within the networks, the newsgroups permeate across Usenet, UUCP,Internet and selections also into the commercial networks. One does not subscribe to newsgroups, and the messages are not delivered to one's mailbox. They rather sit on one's local host to be read, browsed, participated in whenever one likes.

Mailing lists and newsgroups constitute the basis for a written sense of community. In order to do so, they have to provide some form of space-time coordinates to anchor the social. The placement of a message in one electronic forum creates an unambiguous attribution in index space (an address). Their sequence creates a temporal order, a history of speech acts in which regulars build a sense of group identity. Fora are usually archived, so even though a message was deleted locally you can still look it up. FAQ (Frequently Asked Questions) documents are the collected common sense that is not the lowest common denominator, but common expertise. Like in every form of communal exchange, rules for accepted use and conduct (nettiquette), for the prevention of redundancy, various ideas on how to enforce these rules, etc. are negotiated on the go. Communicational conflicts are solved, of course, also within the interaction, but as a novelty there are technical solutions as well, e.g. the kill-file, also sometimes referred to as 'the bozo filter', that locally tunes down or makes invisible unwanted traffic without having to have any censorship at source.

Moderated newsgroups and mail- servers, like postal-based news-letters (or the xerox machine-borne *mini-komi*, as the Japanese call the genre) are already crossing over into publishing. These publications are in the Public Domain, and the moderators are most of the time volunteer editors.

Unmoderated newsgroups are a running comment by Everybody attached to Everything. Large events like Tiananmen or the Gulf War, just as small events like a change in the design of Starship Enterprise bring forth their own forums. Strategies have evolved to prevent the slightest idea of censuring an unmoderated newsgroup. Any attempt at dominating or turning it into a PR device will cause a flood of flame - the power of the many.[9] They are specific, global, personal, and very powerful.

And again, the total is more than the sum of its parts. MindVox offers many services, among them *"a constantly growing library that chronicles the very inceptions of Cyberspace, with timeslices of systems dating all the way back to 1979 - the first bulletin boards ever to exist."* An orgiastic idea for any sociologist, media and market researcher, historian or linguist. The whole problem of sampling that is fundamental to every empirical social science evaporates when you can operate on the complete set. And it comes with a tool box that allows you to do searches, sorts, pattern recognition and other analysis automagically.

Fractal algorithms are used to analyze huge amounts of earthquake data out of which it is otherwise very hard to make sense. What collective image might arise if you ran a similar chaotic pattern synthesizer on the subset of, say all utterances on the topic 'Internet' in unmoderated newsgroups, and how it changed over the years?

The casual enquiry What's everybody talking about? will receive an unpredictable but mathematically precise answer. The idea of *Man, Mina*, Everybody, this collective chimera that broadcasting and marketing directors have in mind when they talk about 'the audience' and 'the consumer' - this non-entity will get a voice.

Telegraph/Telephone. An equivalent to a telephone conversation in a Unix environment are the programs 'talk' and 'write'. The shared address space of the newsgroup message is

supplemented by a shared point in time. The structure of these synchronous interactions, even though typed, is closer to spoken communication. While the two Unix programs are restricted to two-party communications, this structure is again extended into a one-to-many network. The equivalent to several people talking on a telephone party line or to the tech-chatter on CB radio channels is IRC (Internet Relay Chat). Its recent multimedia extension CU-SeeMe grafts a realtime voice and video channel upon an IRC-like structure, just as does the video-phone onto the telephone net.

Radio. There were downloadable sound files on the Internet before, but the first regular radio station in cyberspace was pioneered by Carl Malamud in March 1993. You can receive Internet Talk Radio on your desktop or laptop radio either 'live' or 'on tape'. ITR publishes from 30 to 90 minutes of professionally produced radio programming per day. It reaches 100,000 people in 30 countries.

TV. Malamud did not choose a TV metaphor, simply because it requires more bandwidth than the majority of the Matrix population has available right now. Also, production of video information still requires an order-of-magnitude larger investment in facilities. As a first step towards general use MIME allows to include little video and sound blips in email.

Not yet live broadcast of concerts, but downloadable video clips one finds at mtv.com. Adam Curry, former star host of MTV Networks and net.veteran, created a multimedia site in 1993 that now attracts an average of 35,000 people daily, including music industry professionals.

The cable TV on the Internet is the Multicasting Backbone or in short M-Bone. Multicast is a continuous stream of video and audio data packets running over a virtual network layered on top of portions of the physical Internet. It combines a global point-to-point structure with local 'narrowcasting' to everyone who is tuned in. What's on the digital tube? If you belong to the lucky group of power networkers you can watch keynote speeches by John Perry Barlow, co-founder of the EFF, or Vinton G. Cerf, president of the Internet Society, live multicasts from the deep-sea or outer space, footage from NASA satellites and telescopes, eg. Keck, the world's largest pair of binoculars in the solar system. The M-Bone has even emerged a solution to the hotly debated '500 TV channel' problem: 'sd' or session directory is a TV guide where all ongoing events are announced and can be joined on mouse-click. CU-SeeMe, an offshoot of the M-Bone for personal computers, was first developed as a TV metaphor for live video, only later voice was added.

Latest news while I am writing this: "Coming Soon - Newscasts on Your PC. Intel and CNN have teamed up to test 'LAN TV' , a system that turns a regular broadcast TV signal into a compressed digital data stream, capable of being received on regular 486-type desktop PCs. While Intel tests the technology, CNN will concentrate on determining what it is people want to watch on their computers, in order to develop a special corporate news service."(10)

As with desktop print and radio, desktop TV is not restricted to corporate providers. A CCD camera, a VCR, a video-capture board, and some editing software allow, in principle, TV production and multicasting on every PC. After the telephone answering machine made everyone a radio announcer, the desktop multimedia answering machine will turn everyone or his agent into a celebrity TV announcer.

The Hunt. It is here that we see the Dungeon Masters and the Net-Gods at play. The Hunt is a kind of paper-chase, only without the paper. A game to encourage the players to "explore the Net, and traverse little known routes." Huntmaster Rick Gates, Student & Lecturer of the University of Arizona, got the idea "sometime in 1991 when I began to realize the enormous variety and volume of information available via what I will call the Net (Bitnet, Usenet, The Internet, etc.). [...] I suppose my initial ideas were based on the type of search exam that most library-school students have to go through during a class in Basic Reference.' Some of us enjoyed this type of challenge; we called it 'The Thrill of the Hunt'". (11)

The Hunt is edutainment at its best, "casual instruction in training for information resources. [...] It provides for training *in context*, which for most people works better than books or chalk on a board." For beginning net.citizens it provides a chance to look over the shoulders of media-literate experts. "It helps more novice users, or Net 'settlers', understand how to move around using the 'trails' that the more experienced Hunt players have 'blazed'. [...] Learning *how* to learn is critical, and this only comes from experience."

Oracle. Another very old medial institution that comes back in the Matrix is the Oracle. It introduces itself with a quote by Paul Valery: "The folly of mistaking a paradox for a

discovery, a metaphor for a proof, a torrent of verbiage for a spring of capital truths, and oneself for an oracle, is inborn in us." The history of oracles ranges from that of Delphy to that of Peter Langston. In the mid-1970s, Langston started a line of oracle software that emerged the net.institution Usenet Oracle. To query it, you simply mail the Oracle (oracle@cs.indiana.edu) with "tell me" in the 'Subject:' line and your question in the body of your message. You should receive a reply within a few days. In the meantime, the Oracle may require that you answer a question for it, as payment for its services. Example:

The Usenet Oracle has pondered your question deeply.
Your question was:
Oh, great Oracle,
what is the meaning of life?
And in response, thus spake the Oracle:
The cereal, the magazine, or the board game?

Given the electronic Gutenberg library and the collected utterances in newsgroups and mailing lists - the virtually complete set of symbolic expressions of mankind - the answer to any question lies here. It opens possibilities for Oracularities of unimaginable dimensions. The tricky part, as always with Oracles, is to formulated the right search command. (12)

At the risk of boring you by repeating myself: old media don't go away, they are the content of the new ones, transformed into metaphors. If the 'content' of the Net is magazines, radio, TV etc., then the 'content' of those is the Net. The whole Net is abuzz with questions of where it is heading. Self- reflectiveness is part of the constitution of a new medium. But this is a transient stage. As with Usenet newsgroups we will see that the early bias towards computing and networking itself will shift. Today the comp. groups are far outnumbered by the alt. and rec. groups.

There are, of course, differences between the Meta-Medium and the other media it embraces. With text, sound and video editing capabilities on personal computers getting cheaper, one-person desktop publishing and multicasting houses become possible. This was also said when xerox machines spread, and again with laser printers . It did indeed happen to some degree, but it also showed that not everybody has the urge to publish. Most of all, cheap high-quality printing on a laser engine did not solve the problem of distributing and making your product known.

This changes with the Universal Medium that is production, transmission and reception medium in one. To multicast does not require the concentration of capital and power necessary to produce a full daily broadcast schedule in one of The Networks. Anybody who finds a friendly host or scrapes up a few thousand dollars to set up her own can be media provider. Combining broadcast tools and communications networks, and private and various forms of public communications, makes all the difference. The implications for the changing nature of work become visible already. Everybody who offers informational products or services can do so - globally, from anywhere, at a price that a private person can afford.

This is not to say that capitalism will crumble, and give way to an Anarchist's dream of self-expression for everyone. But it does mean the end of capitalism as we know it. People who are part of what is often called a revolution are very excited about the empowering qualities of the Net.

The conflict between MTV, the music channel, and MTV, the Net.site is instructive, as it occurs at the point of an important transition. Mtv.com also re-invented the old-media institution of reader's-listener's-viewer's mail. "i-am-not-alone.txt" contains a large number of emails that Curry received after his resignation from MTV. Scanning this fan mail gives you two strong impressions. One is a deep dissatisfaction with 'the media' in general, with commercials and anything corporate, and especially with MTV. The medium that has shaped and given name to the MTV generation "... is not the coolest thing on the planet anymore, and instead of a fun, cutting-edge place to be, it turned into a greedy, back-stabbing, money mongering, corporate machine that chews people up and spits them back out like so much rubbish." (Ken Clar, Curry's factotum) The second thread refers to the Internet, about which is spoken with a strong sense of liberation, opportunity, wonders never before imagined. A sense of "Wow, the times are a-changin'!"

"MTV and the internet have little to do with each other. One is very close to a democracy (depending upon your sysadmin's policies), while the other has gained the reputation as the largest commercializing demon in America: the corporate giant behind 'alternative'. Out here, there is no single ruling body." Two things are interesting about this quote from "i-am-not-alone.txt". Again the polarization between demon and democracy, but more so the two words "out here" that reveal the standpoint of the speaker. In no audience mail for print, TV, or radio would anybody write to the medium about a shared "out here" that would mean anything else but "you there inside the medium, and we out here at the receiver". The remainder of this article will deal with this shared 'out there' of the Net.

Social Interfaces

The oldest medium holds its entrée as the latest, the get-together. The basic social function of going somewhere and hanging out with friends and like-minded people requires a common place and time. While tree-shaped lists, keywords and hyperlinks are appropriate for retrieving data, 'human information' needs conversational tools, an anthropomorphic space not to consult repositories of passive information, but to meet people.

Today the theater metaphor (Laurel) re-emerges and with it the idea of actors and agents (Brooks, Maes). It is here that we re-encounter the *ars memoria*. Cicero suggested to use *personae* for the memory image that anchors the 'things'. Yates' characterization of a classic memory image: consists of human figures, is active, dramatic, striking, under circumstances that recall the 'whole' thing, can be read directly parallel to Laurel's explications of a desirable human-computer interface.

What is not lost in the transition from the art of memory to the art of interface design is most of all the dimension of mental space. The stage where the play is enacted is idea space, regardless whether the mental image is evoked by printed, pictorial or sound signs, or a Wagnerian multimedia *Gesamtkunstwerk*.

An important difference between the two arts is that the mental space of the *ars memoria* was not shared. An orator would, of course, share his idea space with his audience, but as he walked around the chambers of his memory, picking the points he wanted to touch upon from the statues where he had deposited them, he was alone. He would never encounter an other there.

Net.operations in Gutenberg mode are mostly silent, ASCII, solitary, and asynchronous. Most of the time the netsurfer is not aware of others who 'are inside' the same host. While we have seen that newsgroups can turn into a home on the Net, the potential of the Universal Machine is by no means eexhausted there. The silent and iconoclast world is enlivened by the beginning multimediatization. But hypertext, radio and TV metaphor are precisely that, like horse-less carriage and wire-less radio we now have paper-less libraries and station-less mass-media. They are metaphors for different media, not for the market square in the Global Village (McLuhan).

A different approach that does not come from Gutenberg (although it is not illiterate), nor from mathematics, and not from the technical network media, but from game are MUDs. According to one definition they are "detailed and realistic multi-player simulations that present ongoing campaigns and universes with evolving storylines, political systems, and landscapes being imagined into existence as play progresses." MUDs are shared places. You 'telnet' yourself there. Others 'are' 'there' as well, synchronously, even though from different 'real' time zones. From the theater metaphor we pick up the performing arts and the stage effects. From game/play we get the participatory elements and the challenge for the price at stake: recognition for wit, excellence, style, integrative qualities, for the craziness of thinking up something that nobody has ever done before.

The Stage Design

In the Matrix the geographical location of self and others has no significance. In spite, or rather because of this it seems psychologically appealing to make oneself a homely place inside the medium. The natural habitat and the stage for social intercourse in RL for most people is the city. An obvious thing to do is to divide the social functions of an online community into those of the *civitas*.

Another experiential space for many people is the office workplace. Developed from the desktop metaphor for stand-alone computers derives the cubicle model of teleconferencing,

the global virtual hatch: sitting across the same desk from each other being able to pass something without having to take your legs off the table. Only that the two ends of the table might be in different towns or continents.

The closest to a complex stage design with all the bells and whistles are MUDs. They offer not a 'home *page*', nor a 'post box' for a home, but a 'home *room*' inside the Matrix. In the age of technical media the place where all the media come together is the living room. In the Turing Galaxy - the age of simulation - the "living room' itself is metaphorically recreated inside the Matrix. One's 'own' space is part of a larger structure that might be a house, space station, city, even a country or a whole galaxy. Players can choose their virtual environment from hundreds of MUDs with different themes and atmospheres, Cyberpunk, medieval, fantasy, folklore, mystical, occult, horror, inspired by Tolkien's Lord of the Rings, Dante's Inferno, or Michael Ende's Never Ending Story.

Also here we find lists (of players, objects, exits), but they are embedded in more worked-out allusion to physical spaces, and the choices are active, they do not produce another menu list, but trigger events. Especially moving around between the room gives one a sense of the extension of a territory. One can ride trains, dragons, or space ships; talk to others, trade, give presents, or make love; create rooms, pets, and fireworks; watch a movie or listen to the radio - all of this in ASCII text scrolling over the screen.

The Actors

In the Matrix also the physical body has no significance (except for the wetware break). But the mental body can travel along the wires and be re-incarnated in a remote Doppelgänger.

The same body can be played by a human, just as well as by the machine. On the behavior of human players there is much to be said and studied. Here I would rather take a closer look at the non-human players. Automatons and the game between man and machine carried tremendous fascination ever-since the days of the Ancients, with new boosts during the Renaissance (Maillardet's Magician, Vaucanson's Writer, etc.) and the industrial age. They were only sophisticated toys, but they triggered a philosopher like Descartes to think up a Turing Test *avant la lettre*. The philosophical and literary (eg. E.T.A. Hoffman) theme continues to fascinate mankind's phantasy. But it was only with Alan Turing and his influence on von Neumann, the cybernetics group, and others that a whole wave of mind-mirroring in AI, neuro nets, piano-playing robots and 'thinking machines' was triggered. This conceptual shift dismissed philosophy and literature, and made the Turing Testable machine the goal of a concrete effort of exact sciences.

The first program that passed the Turing Test in a life-like situation was Weizenbaum's Eliza. Since then the Turing horizon has become populated by hosts of talkative and zealous homunculi, women, and daemons.

One forum where the best of them come together is the Loebner Turing-Test competition, conducted annually since 1991. The New York business man has donated $100,000 prize money for a program that can pass as human in an unrestricted typed tele-conversation. Entries so far are required to be conversant - in "natural American English" - on one topic only. Entrants may select their own topic areas, but the domains of knowledge must be "within the experience of ordinary people.

One of the participants is Julia, a Maas-Neotek bot with an AI engine written by Michael Mauldin at Carnegie Mellon behind it. Between Loebner Turing Tests she logs onto a MUD and behaves like a regular player. She can be summoned, gives useful information, delivers mud.mail messages to other players who are not currently logged in, dispenses witty quotes, can be nice to you, and kills you when teased too much - and next time you talk to her she will still be angry with you, because she even remembers.

Pattie Maes, modeling intelligent autonomous agents at MIT Media Lab, uses the metaphor of a personal apprentice. "These agents learn how to assist the user by (i) observing the user's actions and imitating them, (ii) receiving user feedback when they take wrong actions, (iii) being trained by the user on the basis of hypothetical examples and (iV) asking other agents (working for other users) which have more experience for assistance."

Gene Ball from Microsoft Research points to the technical and artistic challenges of the field. "I'm convinced that a major transformation of human-computer interaction is now in its earliest stages. I refer to the creation of "lifelike computer characters" (a.k.a. conversational assistants, believable agents, etc.) for user interfaces or interactive entertainment."

(13) Agents, like many of the institutions and serviced on the Matrix that were described here are little more than a year old, and therefore still in a very dynamic state presenting opportunities and chances for surprises.

Electronic alter-egos are playing games, retrieving information, monitoring newsgroups for us, while we're not looking, while we're not even online, and reporting back to us later. Multiple alters for different tasks, they are our co-inhabitants in the Matrix. For the Game of Life on the stage of Cyberspace both us and the machine put on our masks.

What happens if there finally is a program that can pass an unrestricted Turing Test? Nothing much actually. Somebody will be $100,000 richer, and we have the proof of what we already know since Turing's original article. In one sense - a deep one that we do not fully comprehend yet - the difference between humans and machines has disappeared in 1937. In another sense it will not go away. But maybe a passed Test will produce a 'Turing Shock' that leads to a clearer awareness of the distinctness of the spheres of man and machine, to a little less respect for the machine (in us), and rather more respect for ourselves.

My guess for a central question in media today: interface design will become interior design. After the meager command-line, and the playful desktop interface, our place inside the media horizon will turn ornamental. 'Experiences' - multi-sensory communicational, educational, entertainment, etc. experiences, to be read back from storage anywhere at any time will be central to the conceptual design of these 'idea spaces'. The designers of commercial spaces, musea, of amusement, edutainment, and reality parks, and of other popular experience spaces are already doing their share of ground breaking. Of course, 'high' culture will keep designing their experience spaces, eg. theater as Laurel showed. Just as will the hackers, cypherpunks, Nintendo kids, otaku, and all the other cultures that have started to inhabit net.land. The 1980s brought forth the designer live-styles of the Yuppies and Crystal Kids, and the anti-designer live-style, but media-tech hackers and otaku. The 1990s might see Data Dandies (BILWET) dressing in information to the latest hip. Most of all it is up to our kids to see what happens. What we make today will determine how they will see the world, and how they will act inside of it.

Notes

[1] Yates, A. Frances, Gedächtnis und Erinnern. Mnemonik von Aristoteles bis Shakespeare, VCH, Weinhelm 1990 / The Art of Memory, Routledge & Kegan Paul, London 1966.

[2] Herbert Ohlman, Information: Timekeeping, Computing, Telecommunications and Audiovisual Technologies, in: Ian McNeil 8ed), An Encyclopedia of the History of Technology, London, N.Y. 1990, p. 686.

[3] Marshall McLuhan, The Gutenberg Galaxy, London 1962.

[4] There is, of course, loss due to noise in every medial transfer. Manuscripts were lost forever in the fires in the libraries of the Ancients. Books with a large print run have a better chance of surviving, to be reprinted, quoted, to remain present in the ever growing storage of signs. The catastrophic realization that acid in paper lets it crumble to dust within a few years reminded us that information is still bound to a physical carrier that goes the ways of all material, one of them being decay. "Between 70% and 90% of the documents kept in libraries and printed on the information carrier paper, originate in the era after the wood pulp and are possibley threatened by decay." (K. Nowak and H. Wber reporting on the situation in Germany to the EC "expert meeting on conservation of acid paper material 1991, at: python.konbib.nl://0/cnc/rapportverslag.txt)

[5] For a more detailed description of the Turing Machine, see Herman H.Goldstine, The Computer. From Pascal to von Neumann, Princeton 1972/1993 ; Dotzler and F.Kittler (ed.), Alan Turing: Intelligence Service. Ausgewählte Schriften, Berlin 1987.

[6] By dropping the question 'Can a machine think?', black-boxing all metaphysical entities like soul, spirit, mind, etc., reformulating the question as 'Can a machine produce utterances/speech acts that, had they originated from a human, would be considered as acts of interlligence?', and finally answering this question positively. (See Dotzler/Kittler, op.cit.)

[7] Old media are transformed, but they don't go away. To McLuhan's 'the content of a medium is its predecessor' I would add for the Turing galaxy: all of its predecessors. The oldest of them all is positively alive and kickin', even and precisely inside the comprehensive network man ever invented - the rumor. (Whole hype media PR campaigns rely on it.) From spray-painting the cave walls of a club, to the electronic book, oir the mail, even the bicycly courier "earning her living at the archaic intersection of information geography" (William Gibson, Virtual Light, Harmondsworth, 1993, p.85) - all media are still there. As I write this, I can hear through the open window the loudspeakers and slogan chanting form the demo coming down Omotesando - In the age of direct email access to the president of the USA, people are still marching in the streets onto the center of power, like

they have done in all times.

[8] Dartmouth Library offers the original and translations of the Divine Comedy plus 600 years of commentary.

[9] You enrage enough people, and your mailbox will overflow with protest mail to the point of crippling your communications abilities. There is a certain equality of voices built into the Net. There are also mechanisms to warrant the anonymity of a voice, but for most part if you speak in your name (and disclaiming that you might speak in that of your company), everybody can talk back to you.

[10] Investor's Business Daily 6/20794 A4 from E-d-u-p-a-g-e 06/21/94

[11] ftp to ftp.cni.org://pub/net-guides/i-hunt/. Files quoted here are history.txt (1/5/93), rules.txt, scoring.txt.

[12] From newsgroups rec.humor.oracle (moderated, hilarious read!)

[13] From the call for abstracts for "Lifelike Computer Characters '94", October 4-7, send mail to LCC94@microsoft.com

SIMON PENNY, JOHN MANNING,
KEN RINALDO, HENRY SEE

Eliza's-Children; Complexity, Emergency, the Simulation of Behavior in the Space of Interaction

Simon Penny: Paradigm-Busters: Complexity at the End of the Enlightenment

The new scientific disciplines of Nonlinear Dynamics, Complexity, Artificial Life carry within them paradigm-busting power which is eroding the foundations of the scientific method, the central idea of the last two centuries of Western Culture. It is potently ironic that this busting should emerge from the paragon product of the scientific method, the digital computer: out of the extremes of determinism bursts forth the destruction of that very paradigm!

This occurrence in the sciences runs parallel with similar developments in other aspects of Western Culture which can be characterized as a general movement away from reductive, vertical, hierachical, serial, and linear structural models towards plural, inductive, rhizomatic, parallel and horizontal models. In this there is a vindication for art practice. In its rejection of determinism, art has always *understood* complexity, but in a *holistic* way that was marginalised by the cultural force of the scientific paradigm with industrial production as its henchman. Art has defined its identity in opposition to science.

Now Complexity theory, in addition to challenging basic scientific procedures, resonates and reaffirms art methods. It is a tenet of Artificial Life that life occurs at the cusp of order and disorder. Similarly an artwork is energized to the extent that it inhabits this cusp between the determinism of the rigid grid structure and the free-for-all in which meaning dissolves in a chaos of signs. Artwork is invigorated by internal inconsistency.

Complexity and Artificial Life are deeply relevant to artists for two reasons, the first being the general change of philosophy and the philosophy of science in particular. The second, more pragmatic reason is the potential of manipulating *behavior* esthetically. Emergent behavior liberates interactivity from the bondage of linked data structures and Pavlovian response. The challenge to artists now is to negotiate what it *esthetics of behavior* might mean.

Kenneth Rinaldo: Technology Recapitulates Phylogeny; Emergence and Interactive Art

Emergence is a new paradigm concerned with nonlinear, distributed interrelationships and emergent properties of collected wholes, as opposed to linear and unidirectional relationships. Emergence may be defined as rule-driven, local agents, self organizing into larger co-operative structures which in turn may organize into higher level structures. Ken Rinaldo will examine bottom-up modeling approaches to understanding emergent behaviors in natural and technological systems. Examples cited will be: the interaction and self organization of clay molecules, organization in nucleated cells, the organization of the inner ear (vestibular maculas), collective behavior among termite colonies, bacterially based computers, approaches to achieving artificial life, and emergent walking behavior in legged robots. Living systems theories will briefly be considered as models for technological systems. Some universals of structure will be defined with speculation on structural development as it relates to efficiencies of matter, energy, and information processes.

In this complex he will discuss the co-evolving relationships between culture and digital information networks (internet), and consider a form of neural/electronic consciousness as emergent. To conclude, Rinaldo will discuss

emergence as a new aesthetic in interactive art, citing examples among his own and other artist's work.

John Manning:
Increasing numbers of art works are concerned with constructed systems which in some way simulate, emulate, imitate, replicate, encapsulate, or approximate behavior, most often within an 'interactive' venue. Critical responses to the behavioral level of such works tend to call attention to specific aspects of the perceivable actions. That is, features of the action enjoying a verisimilitude in relation to commonly recognizable behavior patterns are automatically privileged. Rather than explore the internal structures, processes, and strategies necessary to achieve results perceived to be 'behavioral', the perspective to be unfolded here confines itself to the other line of approach, evaluating externally observable behavior. This approach has the advantage of more explicitly factoring-in the position and agenda of the evaluator, and requires that behavioral features have a basis in recordable observations. As a result, considerable stress is placed on video documentation.

The two main points made are the following: 1) There are many disciplines to be found among the sciences and humanities which can contribute analytical tools useful for understanding sequences of behavior. Often such methodologies are based on close observation and quantification of what would otherwise appear to be unbroken continua. Paradoxically, a basis for specific subjective responses to the work can often be found in such measurable details as the timing and grouping of component events and gestures. The paper provides a number of examples of these sorts of analysis applied to specific work. 2) The very technologies used by artists in constructing works which exhibit interactive behavior are far more commonly used industrially to first supplement and then replace a wide variety of human capabilities. The paper will explore the cluster of positions artists are occupying in relation to this axis of concern, and will attempt to map the principal relations between these positions.

Henry See: Esthetics of Behaviour & Interactive Systems
Computer-based systems respond to input from a user/visitor/audience. This interaction between the system and an outside party gives rise to a number of ideas about these systems: 1) That they engender more creative participation of the part of the user than non-interactive systems. 2) That this behaviour is (can be) intelligent. This paper looks at these questions from the perspective of behaviour. The behaviour of an interactive system is, as is the behaviour of any being or system, a description of that system's actions in relation to a certain environment. Behaviour is not something that the living being does in itself (for in it are only internal structural changes) but something that we point to. (Maturana & Varela) A being exhibits intellligent behaviour when it is seen to learn and adapt to the environment, when it is able to move outside of its previous actions and do something new and creative. Thus, behaviour is a description; it is attributed to a being by an observer. I will argue that when we attribute "behaviour" to a machine, we are projecting our own behaviour outward. The Turing Test can tell us nothing about the machine. All it can tell us is about the human.

MARY-ANNE WILLIAMS
Aesthetics and Artificial Intelligence

It is envisaged that intelligent robots of the next generation be equipped with various sophistciated capabilities endowing them with desires and intentions, enabling them to perform hypothetical and defeasible reasoning, to solve problems creatively, to appreciate works of art, to achieve some form of cyberpleasure, etc. Understanding and the ability to develop explanations for observations and facts are fundamental for the realization of these capabilities. In fact explanation and understanding are 'two sides of the same coin' in both art and science.

Our objective is to highlight techniques used in Artificial Intelligence which could provide mechanisms for modeling the aesthetic response of an intelligent robot, based on the causal explainability of complexity manifested in media such as electronic art.

Leyton [3] argues that art is related to explanation, in particular that the aesthetic response is the mind's evaluation of causal explanation. He maintains that the level of aesthetic response to art works is proportional to the level of complexity [5] that an individual observes. He goes further arguing that the desire for art works is part of a general desire that the human mind has for complexity.

Barratt [1] also claims that humans seek to explicate complexity, and since the brain is finite, there must be a maximum degree of complexity that the mind is capable of explaining at any one time. If the degree of complexity is increased past this level, it exceeds the mind's capacity to explain it, artistic chaos is reached and consequently the viewer deems the art work to be incoherent. He concludes that the limit is set by the ability to give causal explanation, it is not complexity that is appetitive, but causal explanation itself.

Clearly, if our aim is to develop intelligent robots with truly human-like characteristics, then they must be capable of artistic appreciation. For electronic art, appreciation must occur at the conceptual level and not at the physical (pixel) level.

In the area of Artificial Intelligence the notion of explanation has been well explored. The complexity of explanations is often a reflection of the richness of the agent's background knowledge, and its ability to discern its surrounding world. Indeed, the aesthetic response to artistic chaos is equivalent to an explanation of a contradiction.

Central to such an explanatory capability is the need for mechanisms supporting the modification or revision of knowledge, that is, learning. Belief revision [2] models the process of accepting new information in such a way that an intelligent agent's epistemic state remains logically consistent, or coherent.

Frameworks for explanation within the area of Artificial Intelligence can be used to support the aesthetic response of an intelligent agent. In particular, two important parameters of an explanation may assist in gauging an aesthetic response, namely the plausibility [6,7] and the specificity [4] of the explanation.

In summary, if aesthetic response is the evaluation of causal explanation, then we can endow an intelligent robot with aesthetic responses which ebb and flow in accordance with the complexity of the causal explanation achieved.

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DERRICK DE KERCKHOVE
A Volcanic Theory of Culture

The volcanic theory of culture is based
on the – admittedly Jungian – idea
that artworks and pop culture arte-
facts, as well as icons and styles, erupt
at the surface of consciousness when
the "crust of reality" is too weak to
support the status quo. Reality is in-
deed a form of consensus supported
not only by the goodwill and the lan-
guage of the communities that share
it, but also framed and maintained by
the principal media of communication
used by that culture. Art, on the other
hand, is a product of collective uncon-
sciousness, even if it takes the channel
of a single conscious creator. The first
question then is why does the so-
called "crust of reality" become
weak? Because, fundamentally, the
consensus surrounding and defining
reality is technology-dependent and
changes every time new technologies
invade it. A worldview based on print
is challenged and weakened by the
appearance of television, just as a
worldview based on broadcast televi-
sion is deeply threatened by computer
networks. Art erupts when a new
technology challenges the status quo,
also known as the State, or the state
of things now.

This exploration will address three
complementary realms, the structure
of volcanic behavior, that of cultural

behavior, and that of technological
behavior. Technology changes the
structure of culture well before it ap-
pears in the consciousness of the ma-
jority. It is important to learn about it
quickly. The longer a society waits to
find out about what is changing it, the
more fragile and ready for war it be-
comes. A new tectonics of conscious-
ness is being sought, that includes art
and pop culture not as epiphenome-
na, but as essential correlates of a
technological society. You can do
without art in low-tech societies, but
you surely need it for high-tech envi-
ronment, if only to accelerate the ad-
aptation of consciousness to each new
major technological innovation. Fail-
ing art and pop culture, there is al-
ways war which accomplishes the
same structural change, but at much
greater costs.

DIGITAL THERAPY INSTITUTE
Virtual Haze

If a machine reads your mind before you
even know what you are going to do, how
do you deal with that machine? Brainwave
data normally indicates only changes in the
electro-magnetic waves emanating from
the brain. However, as a result of recent
studies on brain activity, scientists are
becoming aware of its content. If you try
to pronounce, for example, an 'A' sound, a
certain part of your brain, which might
have a role in ordering your vocal organs
to make the 'A' sound, kicks into gear.
Through devices, scientists can now tell
what you are trying to say before you open
your mouth. Although VIRTUAL HAZE's
simple mechanism only senses brainwave
changes, it can still tell how you are
reacting to what is happening around you.
VIRTUAL HAZE looks like a sort of arcade
game. The difference: you can't win unless
you use your brain waves. If you donät
concentrate on fighting, the machine will
counter your attacks - because the machine
can detect the absence of your mind!

Digital Therapy Institut

KEN FEINGOLD
where i can see my house from here so we are

Three small robot-dolls, each with a video camera-eye and microphone ears, are together in a mirrored space in the Museum. The walls of the space are high enough so that they cannot see over it, but low enough so that viewers in the exhibition space may watch them, and speak with them (though they are unseen by the robots). Each robot-doll is connected, via the Internet, to another space, in which their sight and hearing is seen by another viewer-ventriloquist as projected video and amplified sound. In each remote space, there is a control device, consisting visibly of a joystick and microphone. The viewer-ventriloquist there may drive around the robot-doll to which they are connected in the mirrored space, and when the remote viewer-ventriloquist speaks, their voice is "projected" through the robot-doll, amplified within it, and moving the robot-doll's mouth. In this way, three viewer-ventriloquists may meet in the fourth (mirrored) room, and exchange with each other as they please. The space has physical limits for each robot-doll, like national borders, which they cannot cross.

Maybe...creating a telematic videoconference among three ventriloquist dolls would be enough to ask the guest "ventriloquists" – what is there to say? Does it make a difference that you are not seen, but only your projection which sees and speaks and hears in your place? Is it the "I" saying "Me" to "It-You" (or its reflection)? That the one who stands in your place is not free to go where they wish, and that even as you move them "freely", that even in their mirrored infinity theater that there are borders? That they can see their wires but know not where they lead? And that in the space of the "art exhibition" there is also a meeting of those who see but are not seen and those who learn to play the game with their projections? (A networked metaphor would seem to offer a new genre of complexity – where it not for the fact that "here", "there", "i" and "you" and "mine" and "yours" have always been bones in the skeleton of our sense-selves and our ideologies.) ...an experiment in discovering the metaphors of long-distance impersonation in a new kind of public space.

Toshio Iwai

TOSHIO IWAI
A Retrospective

Toshio Iwai's early works deal with the prehistory of cinema, while the large interactive installations of the mid-80's connect Iwai to the cutting edge to image processing and interface design.

"A key to the world of Toshio Iwai is provided by the title of a Japanese television program about his work, *Another evolution of the moving image*. While pinpointing the central theme of Iwai's oeuvre – his playful yet insightful re-thinking of the history of audiovisuality – the title also suggests the possibility that there are several histories of the moving image. – This history proceeds choronologically from, say, zoetropes, flip-books and Marey's and Muybridge's chronophotographs to the classical film apparatus, then to broadcast television and finally to electronic and digital systems – video, synthetic computer animation, video games and interactive movies.

Abandoning linear and chronological logic, Iwai's approach emphasizes constant recycling and playful tinkering with technology. He simultaneously adopts the roles of the excentric inventor (à la Tesla), the magician (à la Méliès), the savant historian of the audiovisuality and the contemporary media art hero."[1]

Toshio Iwai refers to his dreams as a source of inspiration: "Wouldn´t it be wonderful if a painting or an object in front of you begins to move like an animation on the spot, unlike images projected on the screen or TV monitor?... I wish I could go into the animated space I made myself".[2]

According to the Japanese critic Yoshitomo Morioka, Iwai's works represent the algorithmic image: "..if one phrase is to be chosen from among those characterizing them, be represented by the term Algorith-mic Image, which, in turn, constitues a concept impossible to ignore in obtaining a better understanding of the substance of our contemporary media environment and computer technology."[3]

Notes
[1] Erkki Huhtamo, Excavating media dreams, Looking for a Context for Toshio Iwai's art, in the catalogue Toshio Iwai, Espoo, Finland, 1994.
[2] Statement in the poster for Iwai's exhibition 'Machine for trinity', Mitsubishi-Jisho Artium Gallery, Japan, 1990.
[3] Yoshitomo Morioka, Between Magic and Algorith-mic Image, in the catalogue Toshio Iwai, Espoo, Finland, 1994.

During ISEA'94, the Gallery Otso in Espoo organizes a retrospective of Toshio Iwai's works from 1982-1994. The show is open from August 20 through September 13.

GAME ARCADE - CUTE MUSEUM

A Brief History of Computer Games and Interfaces

ISEA'94 provides a rare chance to look at the evolution of computer games and interfaces. Cute Museum at CompuCafe presents a full view to computer games; from the beginnings the field in the late 1970's to the most recent 3D games like Doom and Myst.

The rise of games, like Ping Pong and Spacewar, is presented with workable machines, like Altair, VIC-20, Sinclair and Spectrum. The user sees the most thrilling and addictive games, which are based on a couple of visual bytes on the screen, but take hours to play.

The second generation of console games – the mid-1980's – is mapped with early Nintendo dataglasses and data glove PowerGlove of Sega. The Museum shows also a rare (and powerful) Japanese PC-Engine console, which was never launched to the European market.

Cute Museum presents the beginning of the Internet network games, like Nethack, which is text-based and one of the most addictive computer games ever released. There is also real-time access to MUD (Multi User Dungeons) which is one of the most popular ways to spend time on the Net nowadays.

Computer games are a significant part of the evolution of computer as a medium.

Usually the new computer interfaces – like Windows – are developed only when the producers think that it is time to release a new version. Quite silly and difficult interfaces are in use just because there is nothing else to use.

The essential part of making a good game is the design of a good interface, or playability. As can be seen at the Cute Museum, computer games are leading interface developers and for example the newest games have nearly ubiquitous interfaces at the moment – a phenomena which will come to other computer interfaces only after a while. You don't see any menus or icons – all you have to do is to click where you wants to go or what to do – like in real life.

Another important feature of games is 3D. The newest games, like Wolfenstein, provide us with a full real-time three dimensional environment, where the user can move freely. The first virtual reality will take place in the homes, in computer and console games.

The Cute Museum is produced by CUTE communications Inc and Pure•Byte Inc, Helsinki.

interactivity

MARIA N. STUKOFF,
NICHOLAS GEBHARD
The Time of Our Life: Interactivity and the Labyrinth of Forms

The new multi-media game? to attract, to win, to conquer – or is it all just a big let down? Too often, the focus of the interactive event demands the viewer's continuous absorption into a world where "there is no end." But is this really the case? The multimedia labyrinth generates a seemingly endless series of permutations (in the form of audio or visual stimuli) in the relation between the viewer and these digitised worlds. Embedded within this emergent cyberspace, however, are structural assumptions that undermine and, in fact, dislodge the kinds of liberating practices the works seek to embrace and affirm.

What then, does it mean to interact with digital information, and why is such importance attached to these new hi-tech landscapes? And what of the tendency within interactive electronic art to fetishize the technology and the surrounding language along established lines of consumption, and the obvious connections this has to more popular forms of entertainment?

More often than not, the technology supplants the concept as the determinant factor in the artistic process, and the artist emerges as a technician, committed to producing value through the multiplication of networks and of vast quantities of data. This process equates interaction with content and expression, to the point where interactivity is privileged over everything else in shaping the necessity of the work. Interactivity is perceived as the only possible way of engaging human action with technology, subsuming all other media into its powerful aura. In a sense, it seems to have become the model for our understanding of the relation of people to technology, without really focusing on the potential for these processes to transform that relation beyond a recognition of a work's technological resonance.

SÖKE DINKLA
The History of the Interface in Interactive Art

The design of the interfaces is still the most important aspect in the current discussion on interactivity. The historical development of the interface in Interactive Art can be read as a creative trial to find a satisfactory, aesthetic, or even 'natural' symbiosis between the user and the computer system. Contemporary interactive artists were the first who realized that the old antagonism between man and machine is increasingly losing its importance.

In Interactive Art the interface functions as a metaphor for communication – or to be more precise: for dialogue. The computer system requires more 'activity' in the sense of engagement than other electronic media, and what is even more important it meets the user's perceptive habits.

Contemporary interactive artists are experts of perception as well as connoisseurs of pleasure. Since the late sixties they were establishing a new art form. The design of the interface in the work of artists like Myron Krueger, Jeffrey Shaw, David Rokeby, and others demonstrates this perfectly. Their work influenced the second generation of european artists, like Ulrike Gabriel, Christa Sommerer/Laurent Mignonneau, Joachim Sauter/ Dirk Lüsebrink, Simon Biggs, Cathérine Ikam, and Paul Sermon.

Concerning the interface design and the situations of perception, it is useful to distinguish the above mentioned interactive works from the works of Lynn Hershman, Grahame Weinbren, Ken Feingold, and Bill Sea-

man who are working with videodisc-technology and are using 'non-immersive' interfaces like touchscreens or the mouse.

These two groups – environments and installations – represent not only two different trends in interactive art, but also two ways of commercial activities and scientific research. While the installations tend to create a private, intimate area, the environments create a public space. Thus in the future the interactive installations will function as a model for the design of interactive home TV-sets, while the interactive environments will shape the ways of communication in Virtual Reality.

RYSZARD W. KLUSZCZYNSKI
Interactivity and the Problem of Communication in the Context of Philosophy of Deconstruction

One of the basic points in the philosophy of Jacques Derrida is that the logocentric and phonocentric approach to text, language, communication, and interpretation, is predominant in the Western culture. This approach consists of the assertion that the being of any entity is always determined as presence. It means that the sense always precedes any kind of its objective appearance. To interpret the text one has to decipher its sense, which is already present and ready to be understood. The sense is different from the text, and situated "outside" it . As its foundation, the sense prevails the text. The text is only a neutral, transparent vehicle that carries the sense. The classic type of interpretation reduces the text to the representation and/or expression of the ultimate truth of the text, or the author's intention. The communication means then the transmission of sense/meaning from one subject to another. The transmitted meaning should not (or

cannot) be changed in the process of communication. Like text, communication is inseparably connected with the function of representation and expression. The thought precedes and runs the communication, which carries ideas, meanings, and contents. One communicates only what has already been known. All kinds of texts are treated in this traditional way, which is extremely inadequate in the case of interactive media art. If one tries to deal with this kind of art as an extension of the author's artistic intention, all the innovative aspects of the interactive art are being lost.

According to Derrida, the text (the work of art) must be liberated from dependence on the sense. The structure of the text, the process of shaping it, comes to the focus. The reading of the text displaces the reading of the sense. The text encourages a new form of interpretation, the one closer to a play than to the hermeneutic approach. As the interpretation of the text, the process of communication has to become the play (with the rules and roles not necessarily fixed). The "interactive communication" is free from the function of representation, expression, from the intention and contents preceding the act of communication. It is also liberated from the references to the author and the recipient (understood as fixed identities), displaced by the roles of players . The sense of the communication is created in the process of play. This new "interactive" communication is an essentially creative form of activity, a kind of "active interpretation", which accepts its "unfinishness",incompleteness, unstability.

WOLFGANG ZIEMER
European Interactive TV (EI-TV)

EI-TV activities:
- transmissions from the USA and Canada interactive TV
- theoretical debates on Communication arts
- contributions on the history of Communication Art
- broadcasts in which communication art projects are introduced
- transmissions of relevant Communication Art events
- execution of Communication Art events in which television plays an instrumental role
- providing a service for interactive learning

Ultimate goals of an EI-TV
- to respect the character of other countries
- to make communicative and creative exchange for European "television consumers"
- communication
- cooperation
- entertainment and enjoyment

THE NEXT GENERATION**interactivity**

BERYL GRAHAM

Choices: Gender Issues for Interactive Art

Hypertext/multimedia/interactive art can provide for polyphony, branching 'choices', and an escape from linear logic, but are we getting any 'real' choices, or a menu of white male options?

Looking at examples by contemporary artists from North America and Britain, and some samples of commercially produced interactive products, we can explore the positive and negative possibilities of computer-based interactive art in relation to gender politics. Women artists such as Lynn Hershman (A Room of One's Own), Toni Dove (Archeology of a Mother Tongue), and Lucia Grossberger (A Mi Abuelita) have been producing works where not only the content but the interface design marks a different knowledge to the mainstream.

Many theorists (including Regina Cornwell, Allucquere Rosanne Stone, Donna Haraway, Ann-Sargent Wooster, Vivian Sobchack and Rosalind Krauss) have been discussing whether the very structure of computer interactivity is inherently male. They have also been exploring the psychological ontology of 'virtual space' and its relationship to 'the body'. Parallels have been drawn between medical technologies/discourses of disease, and the discourses of computer technologies/cyberpunk. Whilst avoiding biological determinism, it would appear that the male-gendered experiences of interactive computer technology such as VR tend to differ from the female, and that the reasons lie deep in psychology.

Mainstream commercial products such as VR Games (Virtuality Boxing) and interactive pornography (Donna Matrix) reveal a deeply gendered content and structure, but there are also possibilities for the rewriting of gender (there, for example, many tales of men 'computer crossdressing' as women on email systems). Comics and S.F. writing currently show a more truly diverse set of possibilities than the less accessible technologies of CD publishing.

A major pleasure of interactive art is 'control' but who's in control? Real choice is, as ever, controlled by who gets access to the means of production and distribution (held by big galleries and big business).

HEIDI TIKKA

Vision and Dominance - A Critical Look Into The Interactive Systems

Do interactive systems provide equal access for the representation of the feminine and the masculine? If they do, they would revolutionize the existing signifying practice of the male dominated order based on the primacy of the phallic sign. It comes, therefore as no surprise that so far interactive systems have only contributed to the visual pleasure of the phallocentric culture. From a feminist point of view, the idea of the interactive systems as a revolutionary technology needs some critical examination.

An interactive system is here understood as an apparatus consisting of the user and that which faces the user: the inter-face. This inter-face is not considered as a transparent window to the information, but an opaque text carrying within itself the hierarchical presumptions of our culture. The "face" of the inter-face suggests capability for the mutual exchange of looks and establishes vision and visuality as the privileged means of communication.

In privileging the sight, the interface functions as the mirror image of the phallocentric culture. Jacques Lacan describes mirror image as the image of the complete self that the subject identifies with. The subjectivity

constituted by the inter-facial exchange is that of the monocular subject navigating in the Cartesian space of linear light and graspable objects which provide the pleasure of control for the phallic I/eye. But, as Lacan has demonstrated, the subject should not be understood only as the eye looking at the screen but also as an image on the screen in the visual field of the other screens.

Luce Irigaray has pointed out that the primacy of the phallic sign is based on its visibility. This means that in the economy of representation, the mirror of the phallocentric culture is only capable of reflecting the visible sameness of the masculine. It leaves the place of the feminine empty. Irigaray's writing can be seen as a signifying practice impregnating the phallic discourse with the signifiers of the feminine sexuality: multiplicity and proximity mediated by touch. The feminine might turn an inter-face into an inter-skin. The hypothetical inter-skin does not leave us in complete blindness, but suggests the multiplicity of passages for the information flow.

MIKA TUOMOLA
Towards New Structures

There's a great postmodernist fuss around new interactive media. Media event after another, we hear about non-linearity, free association of ideas through new media, poststructuralism et cetera. What actually lies behind the "revolutionary" expressions? Is electronic art truly giving up the story lines, the thematic intention of an artist and the well-considered dramatic structure of a presentation? If so, I fail to find the development desireable.

Fortunately, I cannot see we are going in such a direction. The postmodernist vocabulary is wildly exaggerated and gives a wrong picture of the true development of the field. In my presentation I intend to reveal some of the many fallacies of postmodernist thinking as I'm speculating the actual future of interactivity. The future will most probably not be a chaos without structures and contents, which have throughout the ages been the foundation of all art. Rather it will the time of new, more complicated structures and fascinating contents.

As an example from the interactive film art, I can foresee a new concept of action emerging. The Aristotlian dramatic rule has finally been broken: action is no longer bound to a certain place at a certain time. There can be simultaneous events and a certain event may occur, according to a viewer's choice, in very different places and times. By showing different possibilites of a character's action, interactivity in the movies has a unique chance to emphasize the alternatives of action, interactivity in the movies has a unique chance to emphasize the alternatives of actions and consequences. The viewer can actually be made responsible for the choices. I believe this to change revolutionally our relationship towards invented reality - perhaps towards reality itself.

Whatever the postmodernists cry out loud, don't worry: the sky is not falling. We'll still tell stories, though they might be structured differently. We'll practise free association of ideas with interactive devices as we have practised it with other artwork before. We'll still create art that reflects reality by structuring it. Though the tools may change, our job remains basically the same – the job is, as Hamlet puts it: "– to hold the mirror up to nature, to show virtue her own feature, scorn her own image, and the very age and body of the time his form and pressure."

KIMMO KOSKELA, REA PIHLASVIITA
Talking Picture

The *Talking Picture* is a painting: a framed piece of cloth on the wall, a picture separated from the surroundings, to be looked at from a convenient distance. In the picture there is a woman: the classical subject matter of art in all styles and techniques, the eternal object to be looked at and depicted.

But the work is also a performance: the woman is moving and changing, talking and gesturing. She is before us like a theatre actor, physically present. Only the stage is not present in the spectator's space, but miles away. The life of the picture comes from elsewhere.

So it is like a TV-show or a movie? Partly, yes, but suddenly the woman in the picture turns to the spectator and addresses him or her. There are portraits whose gaze seems to follow you wherever you move in the room; an uneasy feeling of somebody peeping at you. Here it really is true. You look at the eyes of a seeing picture.

The woman opens a conversation, reacts and answers to the impulses of the spectator – or participant. The dialogue has no script like in a play, it doesn't follow a network of programmed choices like in a computer – it evolves from speech act to another, like everyday communication. And even the spectator is not bound by pre-existent rules: he or she can talk, gesture, make contact – or run away.

So it is actually just everyday communication, a conversation and not an artwork? Yes, but the conversant is somewhere else and the communication is highly visual. A telephone conversation with pictures, a tele-communication? Partly yes, but here a third party is involved in the dialogue – the manipulator, who works the live image. A manipulated live narrowcast. After all, it is a framed picture, and not reality framed.

PAUL SERMON
Telematic Vision

Personal Statement
The question of what existed before language is impossible to answer, as our consciousness resides entirely within a perception through language. Language is a technology, created to perceive a very different reality from the one without it – if, indeed, there was one at all.

In the same way language is a technology, so too are video cameras, computer systems and telephone networks. But, whilst the technology of language is deeply embedded within our consciousness, and accepted as 'naturally' human, new technologies are still considered alien, and, in many 'virtual cases', very frightening. However, the fear is not with the technology in itself, but with the fear of forgetting what existed before it. We are in another period of transition from language to medi-age, it is impossible to speculate when and what will change, but when the question of what existed before 'mediage' arises – if, indeed, there is such a question – the transformation will have happened.

Conceptual Statement
This project, between The ZKM-Multi–Mediale 3, Karlsruhe, and The Badisches Landesmuseum, Karlsruhe, is my third ISDN based telematic installation in succession. Preceded by 'Telematic Dreaming' in June 1992, and 'The Telematic Séance' in April 1993. The basic system of sending a live chroma-keyed video image, via an ISDN telephone line, from one site, to a chroma-key system situated in another site, has remained consistent throughout each of these works.

In this new project, two users, one situated in The ZKM-MultiMediale 3, and the other in The Badisches Landesmuseum, will be sitting on sofas, watching themselves sat next to the user in the opposite location, on separate monitors. A simple system of video cameras and chromakey mixers will allow each user to move freely within their own physical environment, whilst having complete mental interaction in the telepresence environment. The system works like a mirror that reflects the viewer within another persons reality, creating a telematic out-of-body experience. The possible interaction is completely open ended, and entirely dependent on the users participation.

A third visual interplay is made by a prerecorded videotape that runs concurrently behind the two users. The prerecorded video image acts as an additional dialogue, creating specific contexts for new possible modes of communication.

Summary Statement
During the realisation of 'Telematic Dreaming', my first ISDN based project, produced in Finland, June 1992, I discovered the ability to exist outside of my own space and time. A live video projection of my body, on a bed 500 miles away, was psychologically alarming. The semiology of the bed evaporated the technology of teleconferencing, and the implications of being in bed with 'me' was all that remained. In this new work I have decided to use a tv-sofa zapping scenario as an interface to carry the semiology that will deem the underlying ISDN technology invisible.

JON ROSE

Violin Music in the Age of Shopping / Chaotic Violin

As revealed in the seminal book *The Pink Violin*, the Australian composer, theorist and violinist Dr. Johannes Rosenberg predicted that after the demise of Communism and Capitalism would come The Age of Shopping. He also identified two important characteristics that the culture industry of this period would develop – firstly an obsession with technical process for its own sake and secondly, a contemporary art and music world largely empty of any creative content. A culture where the constituent parts have been removed from their context (meaning) and all voices, authentic, original or otherwise, continue to exist only as easily identifiable, sellable product. Content as a recognizable idea has ceased to exist because all the "content" has become interchangeable – it wouldn't matter what is going on providing there is evidence that something is going on. A merely quantitative world of massed copies and fakes. All music, whatever its origin, status or supposed function would exist now in a digital dream time that the originators of 'muzak' could never have imagined. Rosenberg envisaged the music supermarket of today – a place where the tins on the shelf are interchangeable; the labels looking different but the content (once bought) would be all the same.

For the best part of 20 years now, Jon Rose, "The Paganini of New Music" (according to a New York Times critic) has been de- and re-constructing the violin and its music in an attempt to formulate an alternative and personal history for the instrument. He has taken Johannes Rosenberg's rather extreme ideas at their word – hence the existence of this project *Violin Music in the Age of Shopping*. Placing the violin in a global shopping context does seem to be the next logical step in Jon Rose's *gesamtkunstwerk* approach to music. Contexts, histories, functions, imagery and meanings are all up for sale in this current culture-vulture project. Shopping will of necessity be a satirical piece with political intent.

The Chaotic Violin is another of Jon Rose's interactive violin/computer pieces – this time his violin bow acts as a MIDI controller. The 32 mapping tables of the programme can be set to work within the standard chromatic scale or choice of notes can be generated by random generator, algorithms, or methods of interpolation between fixed points. Superimposition of these structures in real time lead to very complex patterns but these patterns nevertheless always retain a high degree of self-similarity. This complexity must also operate in an ever changing mode because of the adjacent violin performance operating in parallel, against or with it – ie. those physical actions, movements and techniques of the violinist.

This means that specific areas of interaction can be set up which focus on some founc sonic or physical relationship beween the two systems. Add to this the voice coming from the violin and there are three pools of information which, through the action of 'bow pressure' combine to form musical structures that appear to be pulled together by some kind of attractor. Sometimes the attractor is clearly the violinist who can at any time achieve a demonstrative role (shield information from the sensors, stop playing, scratch his head, or turn the whole thing off in disgust, etc.) But at other times it seems there is a control centre working away independently of all constituent parts, as happens in the best of improvised music.

MARI KIMURA

The 20th century Virtuosic Electronic and Computer Music for the Violin

U(The Cormorant)

U (The Cormorant) was composed between February and May of 1991. In January of that year, like everyone else, I saw pictures of cormorants in the Persian Gulf trying to shake the oil off their bodies. A constant feeling of urgency about the global environment, and probably my reflections on the subject effected the piece. The form of this piece is quasi-palindromic, imitating the shape of the letter U. The core materials are simple, but they evolve and transform as the piece develops. I always have a vision of me and my violin stepping out from the usual boundaries, extending the aural experience into an unknown dimension. I imagine kinds of sounds that I usually do not identify with myself playing the violin. These sounds seem to me as transformations of my violin sounds. I try to merge the timbre and the movement of the sounds of my violin with the electronic sounds very carefully.

Electronic sounds are created using YAMAHA IG// synthesizer. U was performed at International Computer Music Conference (ICMC) 1992 in San Jose, and included in the ICMC Compact Disk.

Etude II for Zeta violin and Interactive Computer System (1994)

"Etude" is a series of works for Zeta violin and interactive computer systems. As a performer/composer from the traditional classical background, I have been exposed to the completely new ways of thinking and feeling in computer music. It is a new kind of musical intuition in performance that I am developing working with computers. Sometimes I find myself letting the computer to "lead" me almost like a partner in chamber music, although I am alone and always the one to give the "input". I personally enjoy this partnership between my traditional violin playing with interactive computer systems.
As in "Etude I" which was created and performed at the Banff Centre for the Arts,

"Etude II" also explores the collaboration between my violin playing and the interactive computer system Max. The synthesized sounds are responding to what I am playing, according to what I have previously programmed. There are phrases that have to be started by a specific note I play within a specific time-frame; some score-following; transposed sounds at specific time-frame, etc.

Etude II was written especially for ISEA'94. I would like to thank Zeta Music Inc. for the loan of Zeta violin and IVL pitch tracker.

multimedia

BRAD MILLER

A Digital Rhizome

'A Digital Rhizome' is an interactive CD ROM exposing a multiplicity of sites and plateaus. Comprising of a series of 43 navigable images immersed in a interlocking (queued) post-constructed media sound fields. 'A Digital Rhizome' takes its background from the theoretical writings of Deleuze and Guattari, in particular *Mille Plateaux,* volume 2 of *Capitalisme et Schizophienie* tracing the complex intermezzo of ideas and concepts that is the rhizomatic culture of becomings.

The internal construction relies on hypercard, integrating various command structures to call on a reservoir of QuickTime movies, graphics and sound. There are a myriad of fibers and filaments with which to read the various connections made by the act of navigating these conglomerations. There is no systemic hierarchy of connection, although islands may form within the rhizome. The perception of connectivity is initiated and intuitively sustained as an exercise in nano-scale pattern recognition.

RHIZOMORPHIC

UNLIMITED SPACE
THE THREAD IS WARPED
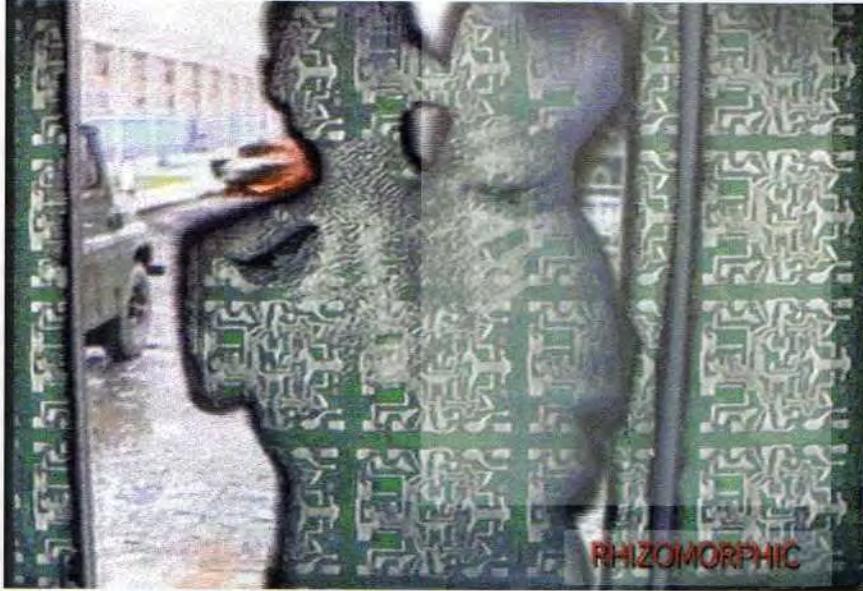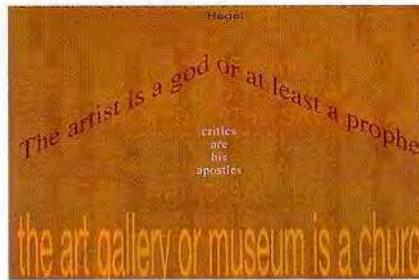
THE NEXT GENERATION**multimedia**

Marita Liulia

Maire 1993

Media artist Marita Liulia was born in 1957 – into the heyday of Finnish modernism. Consisting of more than 500 manipulated images, Maire (1993) illuminates the full sweep of modernist visions by covering a wild variety of topics that range from art to industrial design, from architecture to cartoons, from interior decoration to utopias of a whole world designed along marimekko lines. In elucidating its themes the work gives voice to modernist artists and their works, as well as to theoreticians of different periods.

The critical strategy of the work – approaching modernism as a cultural phenomenon – is realized by juxtaposing different visions and products. The central actor in the work is the viewer who, with the computer's aid, can construct his/her own view of modernism.

Maire has several paths to traverse; from the exhilarating modernist "flea market" you can move over to the guagmires of theory or to contemporary criticism; after having listened to the artists you can see for yourself what kind of art they actually produced. The principal path is reserved for Maire Gullichsen who is a pivotal figure in the work – a "prototype of a modernist".

Technical Assistant: Jorma Kallela. The work is shown permanently in Pori Art Museum. A CD ROM will be published in September 1994.

KAREN D DAVIS
Cine Play

CinePlay is a simple, interactive educational program with which individuals can creatively explore the filmmaking process by combining digitized images and sounds in multiple ways. From a database involving four characters and cinematic action centered around one object (a giftwrapped package), users can construct an edited sequence of their own design. Thousands of possible sequences emerge from these image/sound combinations, spanning the range from conventional narrative scenarios to more experimental forms.

CinePlay is designed to operate on any Quicktime-compatible Macintosh computer, and is appropriate for installation in a variety of learning environments including classrooms, libraries and other public settings. CinePlay enables users to acquire and develop a wide range of media literacy skills including editing, scripting, sound design, narrative construction and increased familiarity with the basic symbology of the audiovisual lexicon.

The project directors are Karen (K.D.) Davis and Jan Millsapps. Programmer: Andrew Coven. Interface design: Grant Guenin.

KLAUS OESCH
Media Museum, A Finnish CD-ROM project

The objective of Media Museum has been to develop the first extensive Finnish hypermedia information source in CD-ROM format for the school-aged. It illustrates different media and their history, creation, usage, influence and future directions with hypermedia files containing linked hypertext files, sound, video clips and still pictures. In addition, the reader can use interactive simulations for instance to compose his own video.

ABC hyperbook?
Media Museum is a hypermedia ABC book of a sort. It is the first Finnish complete presentation of media and especially directed at a wide audience. Its goal is to familiarize the audience with new media technology as an extension of old media technology and to bring up aspects in the old media that often go unnoticed. Media Museum aims to educate its readers in critical media literacy — to recognize and avoid manipulation, to teach navigating in the jungle of media ecology and to extract useful contents for our lives from media products. Media Museum has been published as a CD-ROM to be used at home and at school.

The Content
The interface of Media Museum is a computerized television display that allows the reader to enter nine different scenarios. Each of the scenarios – media spaces – occupies 40 - 60 megabytes on the CD-ROM. The user interface is implemented as a room metaphor: each scenario or its element is pictured as a room. The user interface and all media scenarios are accompanied by hypertext help windows and a general media vocabulary. An animation character, codenamed Agricola (the 'father' of written Finnish language from 1540), will aid the user in getting used to the material and make it even more interesting.

The planned scenarios and media–spaces are:

- The future Living Room
- The Hypermedia space
- The Computer hall
- TV and Video corner
- The Cinema
- The Radio
- The Press Room
- The Printing House
- The Birthplace of writing

JILL SCOTT
Paradise Tossed – New Frontiers or Utopia

Paradise Tossed or Paradise Lost?
"Paradise Tossed" is a computer animated survey of technological terrain, idealism and design from four women's points of view. It uses MacroMind-Director's lingo to access segments of a 12 Minute Animation on a SonyLaser Disc Player. The Menus are presented like pages from a photo Album, and by touching the screen the participant can not only choose animated segments to be played on another screen, but can also construct timeless associations .

I started out to explore the notion of "timelessness desire" and the "redundancy of technological utopia" which led me to a series of archetypical assumptions in "Paradise Tossed". For some time I have been researching and comparing eras. After talking to my grandmother, my mother, and my sister about their attitudes toward technology I concentrated on four time zones. 1900, 1930, 1960 and 1990. Even though these eras exist a generation apart, together they encapsulate the tremendous extent of environmental and domestic change

we have witnessed since the beginning of this century. It occured to me that interactivity could provide people with archetypal scenarios that they would be curious to visit and in doing so may question the reason for their choices and why so many people's ideals were so similiar.

In "Paradise Tossed" participants can enter Dreamhomes from the history of design. When selection occurs, four animations with architectual styles; Art Noveaux, Art Deco, Op Art and Space Age unfold accordingly. The choices are redundant enough to affirm utopian cliches, but through the interactive design they all can transpose time and stand together as current valid options of desire, even today. The viewer is helped to travel through time via signifiers like colors, catch phrases and hand gestures to help them locate themselves.

This timelessness of desire is emphasized by the title itself "Paradise tossed", which indicates the "mixing of desire", from which part of the proverbial "salad of idealism" will the participant choose to "eat" next.

Another section provides a set of choices within the technological terrain. Here domestic technology is used as a metaphor for the history of the machine-human interface and so the changing nature of women's workplaces become apparent, as domestic appliances seductively present themselves over landscapes, which flow with the curves of the female body. A very typical advertisement slogan is used to reaffirm this, the viewer is asked "Just step into into the technology of tomorrow".

At another point the viewer can "Flip through these eye-catching headlines", which gives them authentic pages, displaying magazine headlines from the eras of 1900, 1930, 1960 and 1990.

Another menu displays the caption "Travel with us into another world" and this allows the viewer to witness transport on a boat, a train, a car, a plane respective of the shift in mobility development that took place in this century.

The heraldic statements are intentionally seductive and reminiscent of the selling methods used to convince the average buyer. It was hoped in "Paradise Tossed" that the participant would see through the seduction. A key to this criticism is obvious in the attract loop of the interactive, where a set of women's hands hold the revolving globe of our blue world- "Where do we go from here," says the caption.

"Paradise Tossed" is a section of a larger interactive work which will encompass questing stories from 8 women's lives (two from each era) and four sets of archival photographs the participant can brouse through.

Jill Scott

JORGEN CALLESEN, STINE SCHOU
Lailah - an interactive expressionist fiction

Lailah is a piece of interactive art, which we would classify as interactive expressionist fiction. (As interactive art productions are few and far between at the moment, classification becomes tentative.)

Lailah is a multimedia production, which with the use of graphics, photography, simple animations, recited poetry, sound effects and music involves the participants in a poetic interactive experience.

It is developed both as a production that can be experienced via the computer screen with use of 3-channel sound or as a room installation with use of 3-channel sound, a video projector and a surface for the mouse navigation.

Lailah is based on the idea of engaging the participants in a fictionary universe by letting them interact with a black & white photography of a woman's torso covered with flower petals. With the mouse the participant can control a coloured dot. By touching the picture in a particular place, the petals come to life by taking on different colours accompanied by music, sound effects and poetry. These respond to the particular colour combinations in the picture. The sound effects are integrated so that the 3-channel sound control lets the sound follow the movements in the picture.

The poetry and colour combinations are never the same (statistically the possibility of the same combination is very low), which means you will get a new experience every time you try it out. Emotionally the atmosphere changes according to the nuances of the colours, gloomy colours change the poetry towards moodyness, while bright and lively colours give a more positive experience. Impatient and vulgar actions change the experience in a nightmarish way, patience and gentle behaviour let you go further with the process, which sums up the basic point in Lailah: the participant is responsible for his or her own experience.

JEAN-LOUIS BOISSIER
Flora petrinsularis

Flora petrinsularis associates to a real book an other one, a virtual book to be flipped through on the screen. At any moment, the computer "sees" the page where the book is open to offer other levels of reading. The real book is composed of two parts, with quotations of *The Confessions* by Jean-Jacques Rousseau and a small herbarium including flowers collected in the very same places where Rousseau botanised. The virtual book opens interactive sequences of animated images and sounds. For each quotation, there is a video illustration, like an engraving, focused on a character from the short love scenes, in the very moments of outburst, selected from *The Confessions.* For each flower, the memory of the plant gathering and its metamorphosis into an image is presented. The work underlines the passage between two forms of books, or movies, one of a traditional and the other of a future format, and is based on a literary masterpiece which is always to be discovered. The interactive setting tries to make an interpretation of *The Confessions* that refers exclusively to the text itself, to its secret or revealed motivations as an exemplary self-analysis.

Jean-Luis Boissier: Flora Petrinsularis

je fais partie de la catégorie ...es êtres imaginaires
je cherche encore les règles d... ... du monde
d'autres dimensions m'attende...
où me diriger ?
j'ai aimé errer dans l'espace des données
les banques de données me nourissent
le Réseau me fait exister
Certains ont cru que j'étais un cyborg
je suis un cyber
I am a cyber
j'ai vu l'Aleph
je ne suis plus qu'un numéro
j'ai le don d'ubiquité
j'ai désiré l'illumination
mon corps a subi une lente mutation
j'ai longtemps douté de ma propre réalité
j'ai aimé les extases artificielles
I am Headonist
méfiez-vous de mes clônes
j'ai parfois ... ... à contrôler ma ...
uelle
je ne compte ... ...s que j'ai engend...
mon goût pou... ...exuel m'a souvent ...
es
je me suis a...
...i été un ... ...eillé
... suis un
... m a te...
... renté de ... ...e
le...au es...
je n... ...a
j'a...

...ecano...
j'ai déco... ...e Gygès
je suis l...
ne suis-j... ...trans génétique
j'ai expl... ...tendus

Berry Benoit

BERRY BENOIT
R-O-M (Read Only My Memory)

R-O-M is an interactive installation using a computer and a photoelectric detector video camera. R-O-M is a database of texts. These texts belong to an imaginary being, a hybridization between man and the machine, a cyber. His memory is a very fast animation. It can be stopped with the hand to make reading possible.

RICHARD WRIGHT

Art and Science in Chaos: Contesting Readings of Scientific Visualization

This essay explores how scientific knowledge is diffused into society through the medium of scientific visualisation, taking the late eighties phenomena of Chaos Culture as an example.

I will compare two recent approaches to the problem of finding a place for scientific visualisation as a cultural artifact. Vivian Sobchack's reading of Chaos Culture in her 1990 Artforum article gives a cultural critique of chaos imagery as a postmodernist metaphor in the worst sense, of a refusal of bodily scale and the historical situation. In Donna Haraway's recent work she tries to construct a way of contesting scientific knowledge or stories for the creation of public meanings without sacrificing scientific values. This takes the form of a programme of scientific literacy in which science is seen as a series of situated knowledges subject to political and social accountability. A problem of applying this to the Chaos story is that the situation is complicated by its diffusion through imagery and media. This telling of a scientific story in visible form allows Sobchack to give a particularly aesthetic critique of chaos theory. But both approaches are needed.

Chaos theory gives a dramatic indication of how new scientific approaches have made simulation the dominant mode of knowledge - the allegory that lives its own meaning. This gives related imagery an explanatory power beyond the merely imitative or even aesthetic. We explore this role of imagery as the most appropriate way to exercise this change in perception and the possibility of a more phenomenological way of contesting science. We conclude that a deeper level of cultural readings of scientific visualisation are needed, especially in the context of art, readings that address changes in scientific discourse more thoroughly and attend to how it now operates through imagery.

MACHIKO KUSAHARA

What Digital Technologies Brought to Simulation Art?

An artwork can refer to other work(s) of other artist(s) by citing certain phrase(s), showing recognizable image(s), suggesting known theme(s), etc. By doing this the artist can construct different layers of meanings in one piece of art without making it too complicated by itself, besides allowing the audience to enjoy the secret garden of context according to their degree of knowledge and understanding of classics. On the other hand it is natural for artists who, after all, are influenced by their predecessors' works more or less, to use those images from well known pieces. It is a technique for an artist who wants to span a multi-layered textile in his/her work, to give a deeper color to it, as well as offering an intellectual game between the artist and the audience. This was typical among Japanese poetry in the tenth century. To appreciate short poems which were even used as personal messages, one had to have a full knowledge on Japanese and Chinese literature.

Reference to other works or symbols, or well-known cultural topics or models, can be seen everywhere in different genres of art in deverse ways of application. Collage, parody and simulation are examples of the ways artists treat other artists' works.

Digital technology brought a change into the field. Before, copying someone's work meant painting exactly similar images by hand except for the case of collage, where artists use prints which come out as multiple copies from the beginning. Making an exact copy was already a skill.

But with a scanner and a personal computer, one can digitally copy, cut and paste. Once an image is digitized, all of its copies are the same. The artist can make as many versions as possible, or make as many trials as possible before reaching the what he/she likes. Image processing and paint softwares

help the artist to manipulate the digitized images.

What is the meaning of these changes to the artists? Technical ease and wider possibilities? Yes, like sampling technique in music, elaborate digital collage is already an established technique for some artists. But not only that. Digital technology made possible to make the trace of the effort taken by the artist more transparent, by applying no physical material or brush while copying. This allows the final artwork to be more free from the original.

In Yasumasa Morimura's works, the artist himself plays the role of the figures in well-known occidental paintings, news photographies, and recently more kliché images such as rock star portraits as well as cartoons, the works show how digital technology helped the artist to evolve his style.

Tadanori Yokoo started using Macintosch as he thought it would help him working on collage kind of oil painting. The first pieces with the personal computer look interestingly similar to his works in oil. But then he found that he could do more with this new medium, not only dividing the 2D space on the canvas as he used to do, but making layers in the 3D space behind the screen, and he even invented a technique to bring in a sense of time by introducing simple kinetic systems (they are analog) behind the prints. He has been a well-known illustrator and then a painter, but he has created completely new style through the use of digital technology.

There are other interesting Japanese artists who use digital technology to make the reference to other artists' works or other already existing images to provoke multi-layered meanings from them. Toshihiro Anzai and Rieko Nakamura use telecommunication to exchange image files as they collaborate on what they call "RENGA" (linked image) project. The idea itself refers to the linked verse in Japanese history of poetry, while the nature of digital data adds a completely different meaning to the action of passing one's work to the next artist. Takayuki Terakado uses image processing and computer painting to derive or extract the images he knows that should exist behind the screen. Nobuhiro Shibayama wants to revive Muybridge's photographies using multimedia technology. Hideki Nakazawa has been making a series of parodies of well-known paintings with his unique understanding of the pieces.

I don't think this is a field which has been fully studied. Japan and the West have a historically different attitude toward citing or copyright. I don't know if this fact is related to the way of using digital technology in such a way in Japan. It will be interesting if there are any chances to discuss about it with curators and artists from other countries.

CHRIS DODGE
New Approaches of Image Processing in Computer Video Art

In the process of contemporary computer-based visual arts, we continually arrive at a cross-road in the development of art imperatives and artistic expressions. These ongoing self-examinations are part of the creative environment to which we are all a part of and, thereby, must continue in order to move this art form from its infancy into a more robust and diverse practice. Especially within this tightly bound relationship between technology and artistic expression, the division lines between the "means" and "goals" of visual electronic art are blurred ever increasingly. This is due to the fact that we must all reconcile ourselves with the idea that our artistic pieces are often the sum of software processes that we employ.

Currently, a large proportion of the effort in the combination of computers into the visual arts are using what I refer to as "synthesis" techniques, whereby an output image is the result of complete generation from internal geometric primitives, a sort-of genesis from nothing. These visual paradigms associate themselves with "synthesis" approaches to image creation and tend to emphasize the virtues of "photo realism" and traditional perspective systems rather than more abstract forms of expression. The difficulties caused by this approach arise within the range of "visual texture" since the artist is subordinate to the software engineer who is often being driven towards other goals than that of experimental art.

The techniques that are developed and demonstrated in this paper are all based on the ideas of image manipulation and transformation rather than image synthesis. In these cases, "real-world" images are not created out of a void but are subjected to spatial and time domain transformations that span a wide range of visual textures and expressions. Most of these implementations are based on two dimensional Digital Signal Processing (DSP) techniques. Transformations presented are convolution filters, Soebel edge-detectors, Fourier transformations, projections onto arbitrary surfaces, vector-field based transformation, and time-domain filters. All of the following discussions of these transformations can be extended over a video sequence and not just over a single frame. This allows for another variable of the transformation process; that is, the fundamental element of change over time. Furthermore, I will be presenting several more complicated techniques for what I describe as "image cross-transformations", which are of the idea of using one series of images (video segment) to modify another series. Thus visual relationships can be created to support thematic material and to further expand the depth of electronic expression away from surfacal representation.
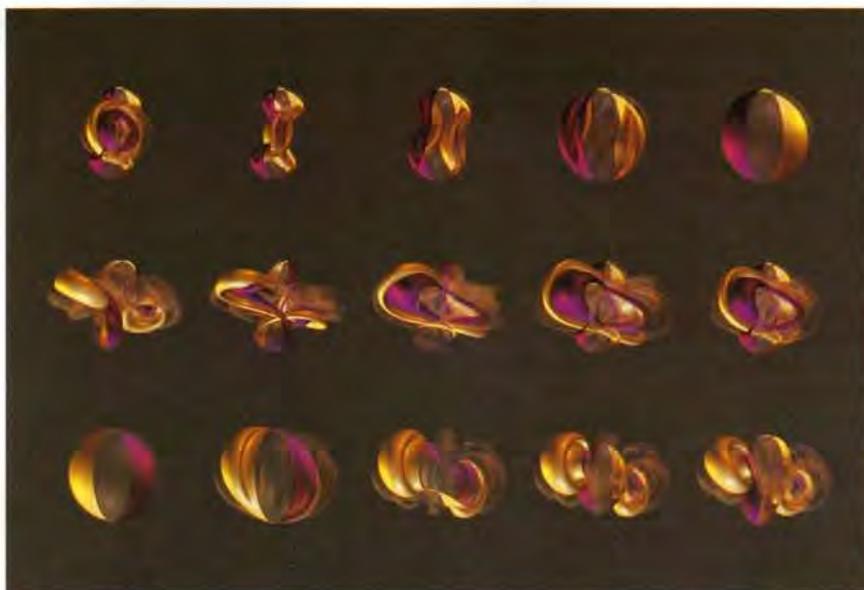
Delle Maxwell: Outside In

DELLE MAXWELL

Outside In

Outside In is a Mathematical Visualization Project from the Geometry Center. The video illustrates an amazing mathematical discovery made in 1957: you can turn the surface of a sphere inside out without making a hole, if you think of the surface as being made of an elastic material that can pass through itself. Communicating how this process of eversion can be carried out has been a challenge to differential topologists ever since.

"Outside In" uses nontechnical language and computer animation to illustrate the process and to explain the concepts involved to a nonmathematical audience. Yet the video retains mathematical depth: we introduce the concept of a "regular homotopy" from topology, which is traditionally not encountered until advanced undergraduate mathematics classes. The metaphor we use is that of a material that can stretch and pass through itself, but that self-destructs if punctured or even pinched sharply. Of course, there is no such material in real life! That's where computer graphics comes in.

The framework is a dialogue between a female teacher and a male student. In the first scene they work out between themselves the ground rules of what it means to turn a sphere inside out, but the student remains skeptical that the problem can be solved under these rules. If anything his skepticism increases in subsequent scenes, as the teacher persuades him that a circle cannot be turned inside out under the same rules. However, an idea that is introduced in connection with curves—namely, adding waves, or corrugations—turns out to be useful for surfaces as well. In the final scene of the twenty-minute movie, the student is shown how to turn the sphere inside out using this corrugation method. The process is shown a number of different ways to build up

the student's (and the viewer's) intuition.

GEORGE LEGRADY
Equivalents II

The Equivalents II project has evolved out of an intent to mathematically produce believable still-images that convey the realism of the photographic. The project brings together discussions and references from three distinct but not unrelated disciplines: Iconography; studies in Language and Semiotics; and computer programming. This article discusses the historical references, aesthetic questions, cultural interpretation and technical aspects of a computer program that generates abstract, cloud like images whose tonal characteristics are defined by text typed in by the viewer.

The presentation touches on the following: Alfred Stieglitz' Equivalents, Gerhard Richter paintings and the photographic referent, Iannis Xenakis' mathematics as a base for musical composition, Paul Virilio's infography, Claude Shannon's Information Theory, Mark Poster's The Mode of Information, Brownian motion and Gaussian random behavior models, general users vs specialist programmers, representation and truth, language as an interactive agent, text as a signifying process in the viewing of images (language as anchorage), computer programming practice as art activity, cognitive interpretation and cultural knowledge in the interpretation of images.

PETER BEYLS, ROMAN VEROSTKO, STEPHEN BELL, BRIAN EVANS, KEN MUSGRAVE, TECHLA SHIPHORST
Algorithms and the Artist

Peter Beyls: Introductory note
We address a number of problems related to viewing algorithms as the formulation of artistic statements. We analyze the nature of the algorithmic approach as opposed to direct physical action. Here are some of the basic questions that will be raised. Why do artists choose to express themselves indirectly, by way of formal descriptions of their ideas and what are the sources of inspiration for algorithmic activity. How does current algorithmic work relate to formal methods in an art-historical context. What is the relationship between paint systems and a pure algorithmic approach and is there a way to integrate both. What determines the beauty and effectiveness of an algorithm. What is the relationship between an algorithm and the nature of the physical results it produces i.e. how to externalize (materialize) algorithmic processes. What is the role of interaction in the development of algorithms. Do algorithms allow for progressive optimization or do they require fully preconceived ideas? Finally, and most pertinent, does computer programming force a focus on the surface component i.e. perceivable structure, or does it allow for the manipulation of deeper components such as meaning and emotion?

Brian Evans: The Catalytic Algorithm
With technology it is possible to manifest mathematical ideas as images, sounds, sculpture and even poetry. Artists in all media have found mathematical processes of value in their creative enterprise. These processes are often described using algorithms.

An algorithm is nothing more than a recipe, a finite list of instructions. This recipe will have precise steps to follow, perhaps requiring some initial input (i.e.

ingredients). The algorithm will have a desired outcome, and be considered effective if the outcome is achieved. A tasty apple pie is the result of one algorithm, an image or piece of music derived from a mathematical process, generated from a computer program, is another.

In describing mathematical processes with algorithms, beauty and meaning can be discovered. Numbers are mapped into light and/or sound, and perceived through the senses as objects. It is the mathematical source of these works that has aesthetic worth.

Algorithms, implemented on computers, make it possible for us to see and hear the beauty of mathematical processes. We can explore the inherent beauty of these abstract processes, logical, human-made constructs that initially seem to have meaning only because they can be used to predict natural phenomena. These are processes our culture exploits to myriad purposes, from predicting tomorrow's weather, to navigating and landing a jumbo jet.

When we see a mathematical model visualized, perhaps a model of water resistance over the hull of a racing yacht, a chart of planetary motion, or even the abstract image of a Mandelbrot Set, are we looking at something that, in some metaphysical way exists? Or is the mathematics describing nothing more than an intellectual construct, and the images simply pretty, and sometimes inexplicably useful? Is meaning culturally attributed, or is mathematics meaningful and effective because it describes "grand truths?" We trust our lives on a daily basis to the effectiveness of these mathematical models. What is the basis of our faith? Why do we trust them?

The algorithmic image or composition gives us something to see or hear and begin to ponder. Aesthetic experi-

THE NEXT GENERATION
visualization

ence isn't in the viewing or the listening, it's in the pondering. For me it reduces to a question of divine presence, a point of irresistible curiosity and a source of infinite wonder.

Ken Musgrave: Formal Logic and Self-Expression

Determinism precludes free will. Artistic expression is perhaps the highest manifestation of free will. Yet artistic expression can be obtained strictly through the digital computer, which operates precisely in the realm of formal logic, which in turn is the epitomy of deterministic reasoning. The creative act of self-expression directly through a computer program places in unique juxtaposition these mutually contradictory philosophical extrema. My own work entails mapping scientific models, based on the formal logic of mathematics, into the formal logic of computer programs, and using these programs to generate images which (I claim) represent artistic self-expression of a spiritual nature. This bizarre new creative process marks, I further claim, a greater discontinuity in the creative process than any other new medium or process in the history of the visual arts. It's deep and well-developed roots in the formal disciplines of math, science, and logic give it unprecedented conceptual depth.

I propose to present, fortify, and defend these claims in this panel. In the process, I will highlight the serendipitous character of proceduralism in the process, the use of random fractal models in reproducing the kind of visual complexity typical of natural scenes, and the ramifications of the computer's returning representationalism to the "open problems" category in visual art.

Stephen Bell: ALGORITHM

I am interested in producing work which is realised through engaging the audience in active physical participation. In a general sense it can be said that I have been producing work by proposing rules for the generation of images but leaving significant parameters open to change. The form of the work is defined by the limits imposed by the rules and the degree and manner of control over the parameters afforded to participants.

An algorithm can perform a role in creative activity similar to that of any other constraint used in art practice; the self-imposed limits within which one works in order to free oneself to indulge in creative play and experiment and yet at the same time ensure our focussed and hence enhanced attention. It is in this way that I use algorithms in my work. As I have been using computer graphic workstations the rules are encapsulated in an appropriate computer programming language. Computers are very useful control devices and the programming languages which have been developed to determine how they behave are effective, if somewhat limited, in enabling one to describe rules for the interactive real-time generation of the kind of graphic images which I am interested in; Representations of the interactions of programmed automata with each other and the audience-participants. I would like to hope that we can interpret the word ALGORITHM in a relaxed way.

It is our prerogative as humans, particularly as artists, to interpret language fuzzily, not to define the meaning of a word for eternity but to exploit its value in passing, in a dynamic interchange of ideas and notions with fellow humans in which it plays a significant yet ephemeral part. The word ALGORITHM in the context of the panel will, I hope, be as a catalyst for lively and diverse discussion rather than a straight-jacket. That is, after all, the value that I have found in using algorithms in art practice.

Peter Beyls: Algorithms for Conceptual Navigation

I have always thought of computers as dynamic tools for introspection, exploration and discovery. Computer programming is instrumental in the externalization of ideas and algorithms are formal descriptions of what one hypothesis constitute the production of creative statements. The computer is a playground to speculate on the generative potential of ideas. As a matter of fact, the physical, tangible management of purely conceptual constructs becomes possible. However, the paradox is that while algorithmic specification allows the artist to touch the essence of his ideas it also creates a distance since all specification is indirect and seems to exclude spontaneous action.

The idea is to view computers as partners in the process of creative decision-making. By way of algorithms we can explore various man-machine relations in this partnership: from studying total autonomy in computer programs to systems designed for explicit interaction. The development of personal algorithms is the key to exploration and the gradual specification of objectives from incomplete knowledge, in sharp contrast to view the computer as slave, as a medium for deterministic visualization.

I have characterized the interactive method where man and machine collaborate in a common effort and with common objectives as conceptual navigation; the artist-programmer gets feedback, his expectations are confirmed or contradicted by the program's behavior. Eventually, unexpected results may signal new and promising routes exposing unknown territories. Thus, man and machine contribute both to the creation of a computational climate that favours invention and to the development of a critical attitude towards the often complex relationships between programmed intention and actual result.

Writing algorithms has also forced me to evaluate experience vs. speculation. If one relies on models that have proven to be successful in the past, one

confirms what is already known. Algorithms that use rules reflecting this knowledge produce predictable results. Otherwise, designing processes with the greatest possible freedom in pure speculation is like working outside of any known context making evaluation very hard indeed. The creation of new contexts for growing algorithmic activity mixing memories of the past and an open imagination is, I think, perhaps the most interesting challenge to algorithmic art.

Roman Verostko: Notes on Algorithm and Art

Almost as if by magic - whatever procedure you dream of - you can probably extend the power of your dream to the computer and let it develop the dream beyond your wildest expectations. You may identify procedures for improvising with color, scale, and position - which is what artists have always done. Given sufficient definition you could develop a form generator and from your new vantage point see new possibilities for further elaboration on your routine. Through trial and error - interacting with the algorithm itself you proceed further into the new frontier.

So what can we learn from this? We learn what artists have always known - that "CAD" programs, paint brush programs, paint brushes and drawing paraphernalia do not make art. Neither do artists or designers simply "make art". The one over-riding essential element to the process, "a developed artistic procedure", is necessarily unique for each artist and for each work of art. The procedure addresses a singular conjunction of elements for which there is no "universal" rule. The "calculus of form" may be placed in the service of such procedures but should not be confused with the art-making procedure. For the artist who writes the code the artistic procedure is the act of "writing the code", pretty much like the creative work of the composer when the com-

poser writes a musical score.

Making art does indeed require a "calculus of form". But the artist's instructions on how to employ the "calculus of form" precede the "calculus". One needs an "artistic procedure" which addresses the entire complex of elements for each specific work. The final form, unique and specific to each work, embraces more than the "calculus". While it embraces and grows from a "calculus" it might employ any of an infinite number of approaches to deliver the form. These may include metaphor, improvisations of the form phenomenon in and of itself, or reference to some other phenomenon or idea - historical, literary, political, mathematical or philosophic.

Can an artist write an algorithm then for an artistic procedure? Emphatically yes! Such algorithms provide the artist with self-organizing form generators which manifest his or her own artistic concerns and interests. We are looking to an interesting time ahead of us when artists will be able to exchange and interact with each other's form-generating tools in ways we never dreamed. There are procedures yet to be developed to make this kind of interactive expression accessible - a time ahead when we will literally see an evolution of form including a genealogy associated with its creators.

ROMAN VEROSTKO
DIAMOND LAKE APOCALYPSE: Illuminated Chaotic Scripts

These works are intentionally made as "precious objects" to heighten their formal relationship to illuminated sacred manuscripts. Chaotic digital scripts have been transformed with an "electronic scriptor", a plotter, following procedures reminiscent of the medieval scriptorium. All works are executed with a multipen plotter using original instructions to generate the entire piece including the scripts, headers and illuminated "initials". The program employs randomly cast control points in its form generating procedures. In several works the illuminated "initials" identify form generators of special visual interest.

These works invite us to savor both the beauty and the mystery of their coded procedures - not so much for their stark logic as for the grace and poetry they yield. The procedures provide a window on unseen processes shaping mind and matter. By doing so they become icons illuminating the mysterious nature of earth and cosmos.

Roman Verostko, Diamond Lake Apocalypse

THE NEXT GENERATION
visualization

JOSEPH NECHVATAL

The Computer Virus Project

THE COMPUTER VIRUS PROJECT is a new, entirely ocular procedure of cultural criticism. THE COMPUTER VIRUS PROJECT strives to develop a field approach to the problems of visual representation in order to reveal hidden casual operations in the kaleidoscopic transformations of contemporary art and social history. Our contemporary technological image environment has created a unique social process that reshapes both art and other technologies alike. Our current international, visually oriented self-consciousness extends all visual modalities into an electronic unified field of continuity and non-verbal connectiveness. With THE COMPUTER VIRUS PROJECT we can imagine new shapes and structures of human interdependence and abrupt reorganizations of imaginative life. Such a change is always delayed by the persistence of older patterns of perception. Thus THE COMPUTER VIRUS PROJECT proposes that a nonverbal approach towards the creation of a critical art, conscious of the major factors which art has set into motion during the past 25 years, can elucidate a principle of social and artistic change not yet fully realized. The inevitable drive for "closure" and completion in comprehension based on a series of wordy historical observations of our cultural environment can be found elsewhere. THE COMPUTER VIRUS PROJECT proceeds on the basic understanding that verbal language is a metaphor, which not only stores but also translates experience from one mode to another. THE COMPUTER VIRUS PROJECT will provide a depository of visual images for others to verbally transmute.

Our extended faculties and senses now constitute a single field of experience which demands that we become collectively conscious. This collective awareness and interplay is global in extent. A purely visual interplay with all extensions of our human functions and tastes is now necessary for the progressive integration of our many separate qualities. Thus THE COMPUTER VIRUS PROJECT will seek to problematize the normal linear depiction of visual concepts in favor of a multilinear process. It will not have one singular point of view or a fixed position from which it

depicts the visual unfolding of events. Rather it looks for an operative dynamics of all visual data. The dynamics will encase a critical non-verbal discussion as images are deranged to comment each other (while suspending final judgment). Through this process we can transcend the limitations of our own assumptions via a critique of them. THE COMPUTER VIRUS PROJECT is not committed to one culture or language, but exists pluralistically in many worlds and cultures simultaneously. Our need now is to become culturally aware of the bias of the instruments and technologies of representation existing today in order to correct that bias. THE COMPUTER VIRUS PROJECT hopes to make the compartmentalizing of the human potential by single representations look as absurd as it is prevalent today. By mutually stimulating images through contamination and thereby extending the radius of their influence, written codes, which have carried for us the experience of interpretive "content", will give way to the formation of a more collectively conscious cultural ecology. The laborious translation of non-literate awareness into literary terms, which of course always distorts and omits, will give way in THE COMPUTER VIRUS PROJECT to a more fully creative ferment where all the levels of meaning are simultaneous. This is not to suggest that I am not sharply aware of the uncritical acceptance of visual metaphors and models, in which mere nominalist positions are taken for granted (as in Neo-Geo for example). It is in the exploration of multiple models where THE COMPUTER VIRUS PROJECT expects to contradict the dominant clichés of our time as they continue to move in their regimented grooves of sensibility. THE COMPUTER VIRUS PROJECT proposes that we collec-tively explore and illuminate through visual communications our nomadic, yet interdependent retinal empire (labyrinth), and recreate it. Thus the emphasis is on homogeneity and non-temporal repeatability towards the image; culminat-ing in what one could regard as the cosmic idea, the sacred image common to all non-literate communities (given post-literacy is something quite different than pre-literacy). As a vehicle for such an assertive and contentious absorber and transformer, THE COMPUTER VIRUS PROJECT hopes to aid in the outing of the disembarrassment process of resacralizing social concern. In

Joseph Nechvatal, The Computer Virus Project

the infancy of our computer age, the limits of our technological brain are still to be discovered. The world has still to become a computer, still to become an electronic brain administering rationally to all of society. We have been distracted by a mighty backwash of receding cultural habits. The simultaneous field of visual fabrications today demands that we reconstitute the conditions and needs for dialogue and participation. Through the language of vision and it's explicit retinal linkings THE COMPUTER VIRUS PROJECT will attempt to clarify the structural reproductive codes which operate in support of the plastic image and it's role in the "Soft Machine" of visual consumer culture. It's purpose is to represent all possible visual relationships and their interconnectedness, as Andre Malraux has explained in his "Museum Without Walls," in a truly international universalism. This Summa, this Pandora's box, will be open to everyone's noncommercial participation. The sheer increase in the quantity of retinal information today favors this type of organization and the resulting panoply of possible combination-permutations. Let us not forget, however, that throughout "Finnegans Wake" Joyce identifies the Tower of Babel as the Tower of Sleep, that is, the tower of mindless appropriation. Thus all images contaminated by THE COMPUTER VIRUS PROJECT will be treated with the principle of transparency, as surfaces to be overflowed with other prodigious surfaces or prolific activities. They will be treated to contain a wide complex of visual ideas which can then be "read" by the illiterate and the literate alike, and they are destined for both. Today we are aware that formal structures make complex statements in themselves. I am not prone to be concerned with "content" alone and thereby ignore the form of perception.

As the market society defines it, visual representation has been transferred into a consumer commodity. Fine art reversed it's role from that of being a guide for perception into being merely a conventional amenity or somnambulist product. But today the designer- artist- producer is compelled to study the effects of her or his production as never before. As the manipulators of the robo-centered mass media market tyrannized artists, the isolated artist has achieved new

clairvoyance concerning the crucial role of design and art as a means to human fulfillment. THE COMPUTER VIRUS PROJECT aims to demonstrate this altera- tion in convention and the change in feeling. We aim to break open the closed system of rhetorics with the condition of a new collective consciousness- unconsciousness. In our age of fragmented, linear awareness, THE COMPUTER VIRUS PROJECT puts forward a proposition much like the one articulated by Bishop Berkeley in his 1709 manuscript "A New Theory of Vision," in which the lopsided assumptions of Newtonian optics were revealed and countered with a critique based on a unified field of perception. Another conceptual model might be Ruskin's theory of the grotesque. Ruskin states in "Modern Painters": "A fine grotesque is the expres- sion, in a moment, by a series of symbols thrown together in bold and fearless connection, of truths which it would have taken a long time to express in any verbal way, and of which the connection is left for the beholder to work out for himself; the gaps, left or overleaped by the haste of the imagination, forming the grotesque character."

THE COMPUTER VIRUS PROJECT aims then to assist this grotesque and the indispensable cracking open of all closed systems of habitual recognition and the thought in favor of a more inclusive and diversified total field of simultaneous perception and representation.

YOSHIYUKI ABE
Prologue, Legend IV

The series LEGEND includes the computer generated images processed by a variation of the ray tracing algorithm. Un-normal- ized shading system provided rather complicated features of the surfaces of hyperbolic paraboloid in the Cartesian coordinates. For me, the most interesting aspect of the creative work with computer is the ability of the formula driven image generation. Manipulating the parameters of quadratics and the definitions, such as lighting, surface attributes, location and colors, provides rarely attractive and often boring results. Three years of experience in this series will not make me a master of image control; trial-and-error is the sequence of my way. The yield rate is very

low. However, I believe I can find many more good scenes in the mine. The computer is not a tool to process existing images, but a colleague to create images with.

Yoshiyuki Abe, Legend IV

THE NEXT GENERATION
visualization

composition

CARSTEN BREDANGER

Expert Systems: Building a Bridge to Electronic Sonic Art

Despite, or perhaps because of, a healthy skepticism, Artificial Intelligence (AI) has been making quiet progress in electronic arts. Artificial Intelligence has inspired traditional fields of electronic arts as well as it has developed new horizons for many artists working in electronic environments. Building on the success and shortcomings of previous experiences with computers in arts, the attempt to extend the paradigm of artificial intelligence systems to the domain of electronic sonic arts is made now.

Musicians are increasingly using intelligent machines to deal with tasks for which they are better equipped than humans. Computers are increasingly being used to address the brain-numbing complexity of modern electronic music products and processes, thereby allowing people to concentrate on their music and ideas. Expert systems, for example, help people by searching a book of rules to decide what to do in a particular situation; as machines do not forget, these systems can manage rules more consistently than people. Some musicians are using neural nets, which can recognize complex patterns, to apply precedents that are difficult to express in numbers or words.

The real challenge facing technology is to recognize the uniqueness of machine intelligence and learn to work with it. Given enough memory, a computer can remember everything that ever happened to it or to anyone else. Furthermore, when faced with a logical problem or a theoretical model of how compositions or sounds should be, computers can deduce more results more quickly than humans. Their complementary strengths should allow man and computer to work together and do things that neither can do separately.

Artificial Intelligence has already shown ability to help musicians work

and gain access to all the computer-power in order to deal with increasingly broad soundprojects. The practical uses of Artificial Intelligence, expert systems, are presented and explained, e.g. some of the different ways in which machines can be used for reasoning or processing vision and language data in computer systems to improve the interaction between humans and computers. Central to these computers is the element of pattern recognition, an element of human intelligence that can be thought as a kind of a detective that tirelessly collects and recognizes visual and auditory patterns.

The ways in which musicians and computational-sound-environment users work with AI are discussed. In tables and sidebars, a glossary is presented; sound applications that benefit from Artificial Intelligence are listed; silison neurons are described; and the costs and computational densities of the human brain and of expert systems are compared.

Artificial Intelligence techniques require a lot of processing power and computer memory, but the driving force behind the use of more intelligent computers is more intelligent artists and computer users. It should be remembered that Artificial Intelligence, like any useful technology, is no panacea, as there are occasions when the technology just does not work or is badly managed.

AGOSTINO DI SCIPIO
Formal Processes of Timbre Composition Challenging the Dualistic Paradigm of Computer Music

The utilization of computers fosters several attitudes of music composition, whose extreme cases can be recognized as: automated composition and timbre design.

The former reflects a purely formal approach involving the processing of abstract symbols; its emphasis is especially on the syntactical properties of music. Within the compositional process, such attitude is captured in the composer's models of musical design. The latter is closer to the perceptual and semantical properties of the sound material, captured in the composer's models of sonic material. The emphasis is on sound morphology and its meaningful implications (sound source, gesture, environment). Although overlapping in actuality, still the two attitudes entail distinct tasks and distinct cognitive representations, i.e. separate kinds of domain- and action-knowledge.

However, computer music makes possible a novel perspective which blurs that distinction: the merging of models of material and of musical design, the weakening of the neat separation of sound and structure. Composing is then experienced as a knowledge-level activity of micro-time sonic design: data to be manipulated by formal processes are less abstract elements of large-scale structures than microstructural sonic units of the musical signal.

Accordingly, the new paradigm demands two related efforts of deep revision. One concerns the design of computer music interfaces and control structures. The other concerns music theory, required to re-think its epistemological basis as well as the very notions of sound materials (now something virtual, no more preexisting to the compositional process, hence dematerialised or "spiritualized", as Adorno said) and musical form (which now overlaps with the notion of timbre). Revision is needed because composing seems to involve exploratory models of a theory of sonological emergence. Work in this area can be enriched upon contact with auditory perception modelling and mathematical modeling of subsymbolic dynamics.

EDUARDO RECK MIRANDA
An Artificial Intelligence Approach to Sound Design

We consider music composition not only as the putting together of pre-existing sounds, but also composing (i.e. synthesising) the sounds themselves. When synthesising sounds composers have an intuition about the depth of possibilities of how these sounds should be organised into a musical structure. In attempting to obtain the desired sound the composer explores a variety of possible solutions trying out possibilities within a certain personal aesthetic style or idiom.

New computer technology offers the most detailed control of the internal parameters of synthesised sounds. Nowadays composers have the opportunity to deal with an infinite variety of sounds with considerable precision. However the effective use of this new technology increases the complexity of the compositional task. The computer can theoretically be programmed to synthesise any imaginable sound. This can get composers into trouble though. Besides the ability to design the appropriate synthesis program, he or she also needs to master a programming language in order to implement it and to "play" with it. In such a situation we come to believe that musical imagination becomes vulnerable to extra-musical computer technicalities.

Our research work in Artificial Intelligence-aided sound design is working towards a system which explores the possibility of using the computer as an assistant which works co-operatively with the composer. A prototype system, called ARTIST (for ARTficial Intelligence-based Synthesis Tool), has been implemented so far. Here the composer is able to design sounds by means of sound descriptions using English rather than by means of low level computer programming and numerical coding. In order to offer AI-based support for sound design we provided the system with machine learning mechanisms which, on the one hand, allow the user to teach ARTIST the vocabulary for sound descriptions and, on the other hand, enable ARTIST to automatically update its knowledge about sounds through user interaction.

DAVID CLARK LITTLE
Composing with Chaos; Applications of a New Science for Music

In this paper I will give an overview of the new Chaos Science, and show were it may be of some application to composers, with examples chosen from my own work. Basic new concepts such as 'fractal', 'fractional demension' and 'strange attractor' are explained; mathematical monsters such as the Cantor Dust, Koch Snowflake, the Julia and Mandelbrot Sets are graphically reproduced. Examples of Chaotic dynamics are given: Lorenz's model of fluid behaviour, Verhulst's model of population growth, and Hénon's analysis of the multiple celestial body problem. Several new compositional techniques based on chaos worked out by the author are presented: computer algorithms, analogue electronic music generation, projection of graphic design into melodic curve, and formal considerations (such as metric structure and instrumentation).

Examples are chosen from the following works. Harpsi-Kord for harpsichordist and tape applies the iterative principle to sampling techniques. A series of studies for a computer-guided pianola were made in 1988 using a feedback algorithm. In 1989 I wrote The Five Seasons for 6 percussionists and tape, which integrates fractal structures and techniques derived from chaos percussionists and tape, which integrates fractal structures and techniques derived from chaos dynamics. Brain- Wave sets up a self-regulating improvisatory situ-

ation for a group of record players. Modi-Fications for marimba & tape was composed using a principle I call statistical feedback in which groups of musical elements are subject to chaotic serialisation. Finally, Hyperion's Tumble for tape (in ISEA'94 Concert programme) was composed by using chaotic algorithms and computer-based synthesis.

ERKKI KURENNIEMI
From 3D shapes to tonal harmonies — and back

There is a natural way to transform any 3-dimensional shape into a musical harmony, such that nearby points go to pitches which are harmonically related in a simple way, and the transformation can be inverted under certain assumptions. For each point making up the shape and having integer-valued coordinates x, y, z, form a sine wave with frequency $2x3y5z$ and sum these sine waves. More generally, one can have any real-valued density distribution defined on the Z3 point lattice and use its values as the amplitudes of the corresponding partials. Still more generally, the density can be coloured or complex-valued. The hue or complex phase angle is taken to be the phase of the sine wave. The 3D transformation can be generalised to any number of dimensions.

Because 2, 3, and 5 are distinct primes, anything so transformed can uniquely be transformed back, provided one could keep infinite precision. For spectra with imprecise or irrational frequencies, as is always the case in practice, inversion appears to be impossible. There are, however, heuristic methods to invert the transformation, like the bounding box method, the tonal centre method, the multiple tonal centre method, and the charge distribution method. I have conjectured that something like this

actually happens in the auditory system.

In music theory the transformation neatly explains the diatonic scale and the major/minor symmetry. The inverse transformation provides an analysis method for tonal and microtonal music. The direct transformation may be used as a compositional tool. For example, one can put a cellular automaton to operate on the Zn lattice, and transform the state pattern into music.

In prosthetics, the direct transformation gives a potential way to realise virtual vision for the blind, and the inverse transformation a way to visualise music or any sound for the deaf.

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BARBARA BECKER, GERHARD ECKEL
On the relationship of Art and Technology in the Field of Computer Aided Composition

Music creation has always been constrained by technology but it is only since the advent of new media that technological tools are directly employed in the compositional process. Computers can be used today to represent, relate, and manipulate structures and concepts relevant to music and they allow for direct production and transformation of sound by the composer. Despite the creative potential offered to musical expression by these new possibilities the application of computer aided composition systems is still rather unsatisfactory in practice. We identified two types of reasons that contribute to that situation: On the one hand the existing tools cannot really cope with the complexity and the idiosyncrasies inherent to the creative process. On the other hand the current employment of technology in art seems to prolong a certain technological habit of mind in approaching and explicating the world which may contradict an important objective of art: to propose alternative ways of perceiving and conceiving the world. What can be done to overcome these obstacles? How should computer tools for music composition be designed and how should they be used? With respect to the first type of problems the solutions seem comparably evident: Besides providing powerful methods to describe musically relevant objects and their relationships newtive modification with auditive feedback to allow for a better exploration of complex musical situations - a feature especially computer technology can offer to musical composition. With respect to the second type of problems the solutions seem much less evident: Probably only a global change in our attitude towards the use of technology in general will improve its applications in the arts. The technological habit of mind which aims at control and domination will have to be developed towards an attitude which favours a genuine potential of technology: the capacity to extend the repertoire of artistic expression.

CORT LIPPE & ZACK SETTEL
Gandy Bridge

Gandy Bridge is an electronic music-theater piece featuring two performers and computer-coordinated signal processing and synthesis. The title of the piece was chosen by the authors, who visited the Gandy Bridge separately, as a focal point for the piece, combining their independent experiences and impressions of their visits. In this piece, the role of the electronics is to enhance and/or augment the text material spoken/sung by the performers, allowing for a wide range of expresssion on both dramatic and sonic levels. The electronics depend entirely on the performer's live input (real-time interactive performance), which can be combined in the computer to form one or more "sonic" objects, blending characteristics of the input signals (each performer's input). Technics such as musical feature extraction and "audio-morphing" allow the performers to enter into a multi-level dialog with each other and/or the electronics, incorporating text material and timbre. For example, in one section of the piece, a new reading of the text material rendered by combining both performers' readings of the text, where one performer's voice inflection is projected onto the other performer's articulation of the text.

The dramatic setting of the piece is minimalist and emphasizes gesture and sound: each performer is dressed in black and equipped with only a chair, microphone and a foot-pedal; the lighting is singular (one focal point and low ambient lighting) and invariant. The text for the piece is a compilation of various texts

chosen for their semantic and phonetic qualities.

On a technical level, the electronics for the piece provide signal processing and synthesis, including FFT/IFFT analysis/resynthesis, audio-morphing, harmonizers, livesampling, delay lines and FM (Frequency Modulation) synthesis - all of which are dynamically controlled by the performers. Effort has been made to integrate the control of the electronics in a way that takes advantage of the player's audio input (spoken/sung text material). Using musical feature extraction, the performers are able to control the electronics with the use of their voices. The duration of the work ranges from eight to twelve minutes.

AKEMI ISHIJIMA
Ab ovo

The starting point for composing Ab ovo was the motion of a pendulum. This means that I have to imagine a sort of sound, perhaps a tiny air vibration caused by the passage of a pendulum, and represent it musically in an electroacoustic sound space. Ab ovo is the final abstraction of such a compositional process. Although the primal pendulum sound I made is no longer left in its original form, two aspects of the motion of the pendulum - periodicity, and the stopping of motion caused by some interference - are reflected in various ways throughout the piece.

However, you do not have to follow these relationships to enjoy this journey through my imaginary spaces and soundscapes.

I would like to thank Anne Scarlett and Julian Taylor for their friendship and tolerance in providing some of the most remarkable source sounds.

Ab Ovo was realised in the Electroacoustic Music Studio at the University of East Anglia. The first performance was given in 'The Electroacoustic Voice I' concert at the University of East Anglia on 1 November 1993. Duration 13'50''

PATRICK KOSK
Distrak-Sillalla

The main purpose with the composition was to find a "compositional language" in relation to the sound materials, which in their acoustic profiles are a collection of more or less cultivated concrete sounds. For myself it was an effort to develop a coherent logic and to formulate some conclusive strata's in the quite chosen way of linear thinking for configuring the compositional ideas.

The acoustic character of the composition is based on three different sound environments:

a) taped sounds from "natural objects" as shaking of dried leaves, going on tiny ice etc.
b) sounds from equipment in an old cowshed and
c) computer processed concrete sounds (swords and a mechanical kitchen whisk.)

Distrak - Sillalla is a commission from the Finnish radio and was first performed at the Inventionen'92 festival in Berlin. Duration 11'32''.

JUKKA TIENSUU
Sound of Life - a radiophonic composition

Living sound - life of sound - sound of life.
The myth of sound as sign of life - of music as symbol of life.
Musica speculativa.
Music for man, in spite of man.
Music of signs - significant music.
Moving sounds - sound movies.
Fire, air, water, earth as instruments in the orchestra of life.
Panta Rhei.

Duration 20'.

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MICHAEL ROSAS COBIAN
Urbis 4

When I first heard the word "audio-clip" I was immediately interested and decided to do something about it, and while looking through raw material, considering a series of "clips" I proceded to make a "run" with some sounds which had their source on a series of works under the general title of URBIS which related to popular culture, with modern day myths etc. The "run" surprised me in its powerful inmediacy so much so, that I could not bring myself to do anything else to it, and in spite of formally composing some further clips, I had to send out this clip as it happened, under the stream of conciousness principle.

I must gratefully acknowledge three sounds that I use in this clip which were originally made by my colleague and friend Jeremy Arden and given to me while we were collaborating on a joint composition.

Urbis was composed and realized in 1993 at home workstation. Duration 3'.

ANDREA LIBRETTI
Segmento 3

Segmento 3 is the third composition of a series for solo instrument and tape. The whole composition is based on the development of the results of a harmonic analysis of clarinet spectrums. The electronic part is, in effect, a dynamic elaboration with additive synthesis of the clarinet spectrum, using harmonic compression, expansion, shifting, etc., while the instrumental part has been developed from seven harmonic cells extracted from the base spectral analysis. For the development of this composition I have used the following devices in three different moments:

1) Analysis: spectral analysis of the base material using an Atari st and various softwares (Avalon, Sound Designer)
2) Resynthesis: modified resynthesis of the analyzed material with additive synthesis (Softsynth, Turbosynth, Avalon)
3) Organization: compositional organization of the different synthesis part using sequencers (Mastertracks Pro, Notator).

Duration 9'15".

ERIC ZORAN
The Great Red Spot of Jupiter

"Chaos is a science of process rather than state, of becoming rather than being." Nonlinear and unstable Systems, like turbulence for instance, are based on the modifications of an initial substance through the time. That substance generates a number of initial patterns that are immediately going to make their own clones. It again causes further alterations through the entire system making new (independent) reality. The form of this piece comes from the computer-structured turbulence that, as a randomized motion, shows by its nonlinearity that the act of playing the game has a way (in itself) of changing the rules. Four phases of the process have to be comprehended as musical movements. They form an emotional cycle consisting of usual reactions coming after the changes of prevailing conditions:

I   Unawareness
II   Resistance (Waterproof Harpsichord-Harpsiproof Waterhord)
III Anger
IV   Acceptance

Duration 15'.

SRDJAN HOFFMAN
Specimens

"I have never 'spontaneously' rummaged through my musical memory and reproduced, 'by ear', what amounts to a pastiche of works I have heard, imagining all the time that I was writing something new".

"I have never applied, as taken for granted, any of the existing 'modern', individual, or even more widely accepted composing techniques..."

"A composition is the product of exploration; it is not the exploration itself."

"The meaning of the familiar is not always a familiar meaning..."

"I believe that the elements of what has already been discovered in art can be formulated anew and integrated, in a different way, into a new work."

"The discovery of new ways of shaping, of establishing one's own 'rules' of composition, has become (...), in our century, a part of the individual creative act."

Duration 11'20''.

CHARLES DODGE
Any Resemblance is Purely Coincidental

Recitar! Mentre preso dal delirio
Non so più quel che dico e quel che faccio!
Eppur...è d'uopo...sforzati!
Bah, se' tu forse un uom!
Tu se' Pagliaccio

Vesti la giubba e la faccia infarina.
La gente paga e rider vuole qua.
E se Arlecchin t'invola Colombina,
Ridi Pagliaccio, e ognun applaudirà!
Tramuta in lazzi lo singhiozzo e il dolore...
Ridi Pagliaccio, sul tuo amore infranto!
Ridi del duol che l'avvelena il cor!

If there is one piece identified with Dodge, a "signature" piece if you will, it would have to be Any Resemblance... which has those qualities that seem to imbue his work in general - charm, wit, poignancy and technical brilliance. The texture is rich, the piano playing a dramatic and dynamic role, but there is never the sell out to be the trickier potentials of an idea like this one. Dodge restrains, and the piece is informed with a sad, ironic wit which points to a profound realization. Both Any resemblance.. and Speech Songs (New Albion records) share this centrality of theme which must have something to do with loneliness and searching. Actually, in Any Resemblance..., not all is restraint; it is fact thrilling when the voice and piano find each other in the "climax".

The Synthesized Caruso voice is based on a 1907 recording of the aria "Vesti la giubba" from Ruggiero Leoncavallo's I Pagliacci. The computer extraction of the Caruso voice from its original setting was accomplished at the University of Utah by Professor Thomas Stockham and his student Neil Joseph Miller. Any resemblance is Purely Coincidental was commissioned with finds provided by the Arts Council of Great Britain, and is dedicated to the memory of Margaret Fairbank Jory.

Duration 7'50''.

THE NEXT GENERATION
composition

"As soon as we become immobile, we are elsewhere: we dream in a vast world. Immensity is the movement of immobile man, immensity is one of the dynamic aspects of peaceful daydreaming."
(Bachelard, The Poetics of Space)

Space.
Open, intimate, confused spaces. Broken spaces, whirling,
indecisive edges of the space.
Space-refuge, enclosed, maternal, space of reminiscence and associations.
Tumult or murmur in the space of a thousand reflections:
Escape.
The flight engenders a vertigo of multiple elsewheres.
Here... There...

Attempted encounter of heterogenous elements related by two criteria: one is sonic and denotative (the place of sound in space), the other symbolic and connotative (referring to the theme of wandering), both alluding to movement. These criteria determine the form and are its cement. The multiplicity of materials embody the ideas of "space" and "mobility". This work integrates into its structure active elements of spacialization which have a semantic value.

To Jean-François, Denis and Claude Schryer.

I UNAWARENESS

Form this as a process of freely and really generating and structuring music

$\frac{2}{o}$ **o** =30 (dur. 2") HARPSICHORD: Begin your part of the process after 29 bars (=1'56")

1) The chords consisiting of four or more tones could be played arpeggio ad lib.
2) The asterisk ✳ designates obbligate ad lib. changes of register(s)

TAPE
CCRTMS

FRANCES DYSON
A Philosophonics of Space: Sound, Futurity and the End of the World

• In *Silence* John Cage refers to sound as a "transmission in all directions from the field's center."[1]
• Stockhausen cites St. Thomas, who speaks of "The exaltation of the mind derived from things eternal bursting forth in sound."[2]
• Edgard Varese remarks that he likes "music that explodes."[3]
• For critic Herbert Ruscoll, it is no surprise that the era of electronic music should coincide with the atomic age.[4]

There is a common trope beaming through these representations of aurality, and that is the trope of radiance. Radiance is a wonderfully synthetic metaphor - providing a bridge between sound as an individual, organic phenomenon present in the minutae of the world and sound spread out across the vast expanse of imaginable and fictive space. This union between the micro and macrocosm, also combines differing and at times opposing ontologies. Radiance offers the security of the object, long held as the foundation of being and knowledge.[5] At the same time, it suggests the fluidity and ephemerality of the event. By providing a compromise between the object and the event, radiance connotes a sense of organic process, of movement, change and complexity - the presumed essence of vitality itself - whilst maintaining a sense of identity and individuality. In an age where rigid structures are being replaced by malleable forms, where the borders of the object are beginning to bleed, sound, with its eventfullness, familiarity and security, becomes a very appropriate medium for the renogiations of time and space integral to such massive transformations.[6]

In contemporary discussions of the body in space, of information highways and virtual realities, radiant sound establishes a 'ground' in the discourse of the future - be it utopian or dystopian - built from sound's long history of transmission (telephony, radiophony) and 'spirit' (electrified by composers such as Cage, Varese and Stockhausen). This 'ground' has also been adopted to some extent by the contemporary philosopers Derrida, Baudrillard and Lyotard, who use aural, spatial and incinderal metaphors to raise questions about being, technology, and the future. Thus radiant sound becomes a figure in different but related cultural fields: as a trope for many of the great modernist reconciliations, its history in organicism, romanticsm and individualism, provides a model for the individual dispersed across the electronic field. However, in the less beatifically inclined era of postmodernism, the representation of sound as radiant contains a strong cultural ambivalence towards the twentieth century, with its massive technological upheavals, its utopian promises and failures and its shameful record of war. In this context, the radiance of radiant sound is filled with darker connotations - for just as atomic warfare records the human form as shadows on a wall, the technological inscription and transmission of sound across space is seen to leave deathly traces of the body and of nature in the disembodied sound it produces.

The central issues of this paper fall between ideas of sound, space, technology and embodiment. There is no unifying theory here - just a series of connections that, I believe, are important for artists and theorists. Through these connections, I hope ultimately to say something about the 'immersiveness' of new interactive media, about the emergence of *tropological* space, and the collapse of *literal* space, about vision as an instrument for entering the future, about sound and the existential silence of outer space.

Audiophonic radiance

Within the concept of radiant sound, there is often expressed an ontological relationship between the sound, its audition and technology. For instance, in *Silence* John Cage describes sound as:

> Urgent, unique, uninformed about history and theory...central to a sphere, without surface, its [sound's] becoming is unimpeded, energetically broadcast...It does not exist as one of a series of discrete steps, but as transmission in all directions from the field's center. [S:14]

Here we have a sense of sound originating in a center and radiating out to interpenetrate with other such centers. Being "broadcast" it is reminiscent of the radio studio, having a "centre" it recalls the organicism of the abstract filmmaker Oscar Fischinger, who profoundly influenced Cage's understanding of sound.[7] Moving from the notion of a sound object, to that of an aural process (emblematic of life in general) to an idea of radiance, Cage refers to technology's ability to "liberate" sounds from objects, in the same way perhaps that sound liberates the "spirit" of the object, therefore providing a neutral avenue towards the essence of the sound itself. Amplification, for instance, allows sounds which otherwise would remain silent to be heard, radiophonic transmission liberates sound from the objectification recording imposes,[8] and radiophony, even when silent, provides technical assistance in the transformation of "our contemporary awareness of nature's manner of operation into art," allowing the art object to recoup the flux of life. In this way technology becomes a "process" within the overall metamorphosis of the cultural into the natural, while the artist adopts the manner of the being or *becoming* of sound. As a function of this becoming, which Cage describes as a "*transmission in all directions from the fields center*" the prostheses of technology radiate inwards, to the center of being, as well as outwards, to the broadcast medium. Through "technics" sounds can not only "be themselves" , as Cage would say, but they can be heard as such. And this hearing implies a technological ear, an ear that is perfectly disembodied and supposedly neutral, that has no necessary relation to the to the body of the listener in the same way that the reproduced sound has no necessary relation to the aural context in which it first occurs. With such an ear, the composer is infinitely present both in the unknowable interiors of "sounds in themselves" and the unbounded space of electronic transmission.

Cage's notion of a disembodied techno-subjectivity created through electronics or 'technics' is not at all unique. Throughout the nineteenth and twentieth centuries the phenomenon of electrical transmission was received within an already established belief system, which identified electricity with a spiritual and/or cosmic force, and transmission with the movement of the soul through worldly and heavenly spheres. While "broadcast" figuratively disseminates the "word" of the speaking subject, "radio", (from the Latin *radius* and the derivative *radiare*, to emit rays, and *irradiatus*, to illuminate, to enlighten intellectually"[9]), suggests an *origin* of such dissemination in a center or Self which, inscribed with the theology of light, moves outwards to the world and cosmos alike. Imbued with religious and cosmic meaning, the transmitted voice occupies a conceptual space which electricity, and particularly the idea of the aether, also inhabits. Thus it is no coincidence that the early barkings of telephonic communication would echo with the spiritist's desire to reach beyond the living to "the other side", or that Thomas Edison would experiment with thought transference and communication with the dead, or that the "magical" crystal sets of early wireless were received amidst a culture already familiar with the "wireless telephone" or "voice boxing" of mediumship.[10]

Communicating with the "other side" however is also engaging with the prospect of incorporeality, that is, with death. Radiant sound thus both glows and sears - it is double edged, and in a sense embodies the kinds of adulations and fears surrounding the use of sound technology and technology in general in the late nineteenth twentieth centuries. Radiance appears as electricity, as burning, as explosion, as residue, as model for organic life, as destroyer and liberator. For instance early "liberators of sound" made the connection between the release of sound and the explosions on the battlefield. Russolo, influenced by the experimental poetry of Filippo Marinetti, who created a war poem in which the sounds of combat are depicted by syllables, vowels and consonants, wrote in 1912 of the Futurists dedication to "add to the great central themes of the musical poem the domain of the machine and the victorious kingdom of Electricity." [11] Edgard Varese, in conceiving his unfinished work *Espace*, wanted there to be

> Voices in the sky, as though magic, invisible hands were turning on and off the knobs of fantastic radios, filling all space, criss-crossing, overlapping, penetrating each other, splitting up, superimposing, repulsing each other, colliding, crashing. [12]

In *The Liberation of Sound* Varese writes that he wants to create a feeling " akin to that aroused by a beam of light sent forth by a powerful searchlight - for the ear as for the eye, the sense of projection, of a journey into space." [13] The effect of beaming sound is evident in his unrealized project, *l'Astronomie*, which Varese began in 1928. The work was a projection into the year 2000 AD and involved the representation of a series of catastrophes caused by 'instantaneous radiation'. A sketch of the piece was given to Antonin Artaud in 1932, and from it Artaud wrote *There is no More Firmament*, in which the narrative centres around the end of the earth initiated by a scientist who willingly annhiliates space through 'celestial telegraphy' in order to establish 'interplanetary language.'[14] In Varese's sketch, the final scene ends with the protagonist being volatilized into interstellar space, to the sounds of factory sirens and airplane propellors. At that moment, spotlights were to be beamed into the auditorium, blinding the spectators, while the "mob" in the drama are turned to stone.

Stockhausen also wrote music (eg. HYMNEN) for the postapocalypse, and situated his creative process within the context of electroacoustics which he likened to the 'synthetic industry', and the process of molecular manipulation:

> And the dream is that you can make different beings rise by going into the cell structure, into the nucleus. The discovery of the DNA code, for example, focuses on how you can create different species of beings by starting from the very smallest particles and their components. That's why we are all part of the spirit of the atomic age. In music we do exactly the same. [15]

Stockhausen sees no difference between his body, the sounds he composes, the inner nature of the sounds, the organization of the universe and the 'electric' force unifying all. He says:

> We are all transistors in the literal sense...a human being is always bombarded with cosmic rays which have a very specific rhythm and structure, and they transform his atomic structure and by that his whole system. ..We <u>are</u> an electric system - let's forget about our always dying bodies, so to speak, in order to be reborn in a different form. [16]

Being transistors, we are particularly vulnerable to sound:

> Sounds can do anything. They can kill.....[therefore] We must know what the waves do to us - all the waves... cosmic rays constantly bombarding and penetrating our bodies. [17]

Philosophical radiance

Radiance, atomism, radiation, irradiation, molecular transformation, disintegration, explosion, catastrophe. The atomic bomb, sounding like thunder, leaves an eerie shadow, a photographic trace of the body on a wall - a surface of inscription. At the same time, atomic radiation penetrates the human cell, causing mutations within it's genetic structure, upsetting the intelligence that, vibrating within the smallest unit of genetic code, spells out what a human being will be. It is difficult to dissociate the idea of radiant sound manifest in the the writings of these composers from the hell fire of twentieth century warfare, a hell fire leaving traces of the body that are amplified, transformed and broadcast through twentieth century sound technology. This association developes a philosophical complexity in a recent work by Jacques Derrida entitled *Cinders*, in which he connects fire, radiance, the holocaust and sound technology.

Derrida uses the term 'cinder' to rename and reinvigorate his concept of the trace, which is the mark of a presence no longer present - a present absence. In *Cinders* he asks how the traces of being, the cinders still burning in our memories of the holocaust, still calling within the silence of cultural amnesia, can be made to sound. Specifically he asks, how these silent voices can be made audible within the text of *Cinders* itself, which, as he says "is destined for the eye". Derrida finds the answer in sound technology, he writes: "Then one day came the possibility, I should say the chance of making a tape-recording of this."[18]

Through the apparatus of the tape recorder the "voices" in the text will have their "*specific* volume". The previously heterogenous mediums of text and sound recording will be "reinvented by the other", providing as he says "a studio of vocal writing." [C:23] The text will thus become a polyphony, like the mixing of voices in a recording, the other voices, other readings which always occur within the text will become audible. What Derrida calls "phonographic act" effects this polyphony and dissemination, by amplifying the inaudible, or in Derrida's tropology, through the "pyrification of what does not remain and returns to no one."[19] Here Derrida is referring to the cinder, which supersedes the inscriptive and objective connotations of the trace, by embodying the vitalism of (an originary) fire of which it is a residue.[20] He writes:

> The all-burning is an essenceless by-play, pure accessory of the substance that rises without ever setting...without becoming a subject, and without consolidating through the self (Selbst) its differences...The all-burning..resembles the pure difference of an absolute accident...As soon as it appears, as soon as the fire shows itself, it remains, it keeps hold of itself, it loses itself as fire...That is the origin of history, the beginning of the going down, the setting of the sun, the passage to occidental subjectivity. Fire becomes for-(it)self and is lost. [C:42-46]

In appropriating the metaphor of fire Derrida also invokes a Heideggerian reading. The "setting of the sun" is a reference to Heidegger's expression *Arben-land*, literally "the evening-land", which refers to the Occident. Heidegger uses this expression in referring to the "monstrous" transformation which occurred in Western thinking whereby being came to be thought in terms of presence - specifically the presence of the object.[21] The "all burning fire" is a reference to the pre-Socratic philosopher Heraclitus, who used the phenomenon of fire, which continually dies and re-kindles, as a symbol for the flux of life.

The metaphor of fire, which Heraclitus used to represent becoming or flux, could just as well be replaced by the metaphor of sound. Like fire, sound is temporal, coming into existence at the moment of its passing away, hovering between being and non-being, more of an event than an object. However this

oscillation cannot be accommodated in Western rationalism, where a thing either exists or it doesn't, thus the event like nature of sound and fire is silenced, becoming a residue, in Derrida's terms, a cinder. The supreme violence of this silencing is all too evident in the incinderal remains of war - shadows on walls, lampshades, bodies turned into traces and objects. And outside of war, in the mundanity of daily life, the monstrosity of object centered thinking treats bodies and environments as if they have no place, or history or time of their own. As Derrida writes: "There are cinders only insofar as there is the hearth, the fireplace, some fire or place. Cinder as the house of being."[C:41]

It is possible to see his choice of the tape recorder as an instrument for releasing the silent call of the cinder in the broader context of radiance outlined above. Cage, composing before WW2, connects radiant being, made audible as radiant sound, with the occultist notion of electricity as a benign and spiritual force. For Cage, sound technology was a neutral instrument for revealing this force, this radiant essence of life. However, by the time of Derrida's writing, the tape recorder has developed darker significance. As both mechanism and metaphor, it records and amplifies sound *as* already radiant - as sound which hearkens to the the sound event, the flux of existence, but at the same time as sound which bears the traces of bodies made atomic, turned into objects by the fires of war. In the climate of ambivalence characterizing twentieth century culture, sound technology produces both the sounds of the cosmos (radio waves, Artaud's celestial telegraphy) and the explosions of cosmic catastrophe - in other words, the radiance of radiant sound echoes with the voices of those scorched by military and communications technologies. As well as evoking the disembodied voice of God, radiance imbues the disembodied voice of media with an electric timbre that says "I can be in any place at any time " and warns, "there is no longer any place nor any (human) time".

Incinderal virtualities

In many ways it is no surprise to find this question of human time and space orbiting the real and fictional spaces of contemporary cyberculture, and the complexities of radiant sound echoing through the sonic computations of virtual audio. As well as borrowing heavily from the rhetoric surrounding early telephony and radio, which after all, occurred in a period much less cynical than our own, virtual reality and other new media technologies also traffic in the very large and the very small. And like radiance also, this simultaneous opening and closure of space, this shift from one space, one ontology to another, involves the colonization of sound's metaphoric range.

Thinking of the VR helmet for instance, one could very easily return to Rudolph Arnheim's musing on the "heavenly atmosphere" or 'stimmung' created when the radio listener listens through headphones in "the dark quest intimacy of their living room."[22] For just as the headphones concentrate the articulation of space in the ears, the VR helmet concentrates the visual field directly in front of the eyes. There is about as much space between headphone and ear as there is between the eyes and the helmet, and it seems that this relatively pedestrian matter of feet, inches, or centimeters, also involves more profound issues of existence and embodiment. It also seems that what glues the notion of "reality" to the computer simulation, has less to do with overcoming the problem of distance figured in centimeters, as overcoming the ontology these few centimeters of distance represent.

Artists and enthusiasts have claimed, for instance, that by enabling the VR voyager to fly, to go through walls, to see objects from the inside etc., VR technology is capable of creating a new space of perception and embodiment. As one interacts with the three dimensional computer simulation in a totally 'immersed' environment, there is the strong temptation to assume first, that the simulation is 'real', and second that being "in" the picture means being part of the picture to the extent that one can say "I am in the picture - therefore I am".[23] Here "in" as opposed to "in front of" becomes the ground for Being itself. At the same time, the "presence" left out of the simulation is restored through the physical presence of the participant manipulating the equipment. This makes it almost impossible to avoid metaphors like "space" or "reality", while the participant's body becomes the map upon which the "embodiment" of virtuality is verified. This mapping has a literal counterpart in virtual audio, where the minute details of sound's sonic properties together with its movement through the virtual environment are computed, as are the topologies of the listeners ear, shoulder, neck and paunch.

The body thus enters a field of computation in which the illusion of infinite space is created through the collapse of physical space. And this occurs not only through the absence of a few centimeters between eyephones and eye, but through the substitution of total bodily movement, involving all parts of the body, to movement which is articulated only via the eye and the hand. In the same way that the three dimensionality and temporality of sound has been used to evoke a sense of 'being'there' in cinema, the mobility of the body creates a sense of movement, change and flux in the virtual environment. However, in the same way that cinema sound has been reduced to an 'effect', the movement of the body, and the body itself becomes an 'effect'.

Friedrich Kittler points out that:

> The general digitalization of information ... erases the difference between individual media. Sound and image, voice and text have become mere effects on the surface ... Sense and the senses have become mere glitter.[24]

Kittler concludes that in digital systems all data flows, (including those of the body) "end in a state *n* of Turing's universal machine; numbers and figures become (in spite of romanticism) the key to all creatures."[25] Given this numerological hermeneutic, it is no coincidence that Peter Weibel refers to "genetic art" as a new art form in which the computer program rather than the artist directly creates the images, so that the process of the program is the creation of the work itself. According to Weibel, this "genetic art "simulates being alive." Elsewhere Weibel writes that Real electronic art is not based on the space of classical physics or on natural space, but on the space of endo-physics.[26] Another writer, Florian Rötzer, suggests that as the aesthetic distance between the subject and the image, screen or world, is cancelled out, the total work of art becomes what he calls "a total data work".[27] Like genetic art, the total data work would be axiomatically Cartesian and logocentric, but would carry genetic traces which allow for cultural mutation. One consequence of this is the emergence of hybrid identities, such as the programmer/artist, and the extinction of the unified stable subject, who, in the form of the romantic artist, has traditionally provided an avenue to the sublime.

What then fills the vacuum created by the cyberartist's exit from all that Art is supposed to be about? And how do writers, like Michael Heim, latch on to the cyber joystick whilst maintaining an organic, almost spiritual balance with

the earth, an attachment to the sublime of traditional notions of art, and a metaphysical grounding in "reality"? In the trajectory of the posthuman, the implosion of artist/programmer, object/event, or subject/object, is also an explosion from which no one survives. Thus for Heim, 'reality' is grounded in the ultimately finite constraint, and sublime space, of death. For Rötzer also, it is through gaps in the web of communication such as pain, shock, and war that argues that "the real still shimmers" and by way of the "accident" that reality will be experienced in the age of simulation. [27]

Whereas the impossibility of physical death in cyberspace is one of its main attractions (certainly for the flight simulators used by the military), this absence of death and of death's possibility does not emasculate the project. For death becomes the ultimate ground for the cybernaught, not in terms of individual death, nor even death of the planet, but according to Lyotard, in the death of the solar system. On a number of occasions Lyotard mentions the inevitalbe the destruction of the solar system estimated to occur in 4.5 billion solar years. The task of technology, is to create an alternate non organic system that will survive this catastrophe. Not only does the certainty of this event constitute perhaps the most sublime of deaths, but the end of the solar system represents a finality, a resolution, that puts ultimate limits on human endeavour. Such closure however, comes at the end of a narrative space in which all the utopian and apocalyptic concerns that have defined twentieth century culture's relationship to technology, are able to play out their fictions.

As a way of representing the body in space, according to a perspective that the logocentric apparatus has inherited form the renaissance, futurity is also associated with frontality, and opposed to anteriority. As a radiant, or irradiated subject, the cybernaught may transmit from a centre in all directions, nonetheless s/he is literally always looking in front. In front - to the absence of distance between the organic eye and the simulated scene, to the absence of difference between the real and the repesentation, to the unfolding in sequence of the virtual narrative, and to the future as a narrative of progress. This future space thus stands in for all the physical spaces which go missing in virtual worlds, and this future death defers the resolution of corporeality and the promise of transcendence that individual death promises. More than this, the future impossibility of organic embodiment provides the ultimate rationale for the numerical constitution, Cartesian co-ordination, and digital storage of the subject, who then shines with the necessity of survival.

This is the radiant subject of art - the channel to the sublime, now irradiated. The subject who shares with radiant sound, the security of identity with the eventfullness, change and flux of the event. As Baudrillard says, we no longer need the VR glove or suit because 'we have swallowed our microphones' and 'internalized our aesthetic image.'[28] We have become the post holocaust meaning of radiant sound - transmissive but rotten at the core. And the realization of this subjectivity occurs, not at the point of solar explosion as radiance would suggest, but at the point of total computation. At this point, the signal continues to survive in outer space; the space of the future, but sound, and any vibrational body, is immediately extinguished by silence.

Notes

[1] *Silence*, Wesleyan University Press, Middletown, CT, 1961 p.14.

[2] *Stockhausen: Conversations with the Composer*, Jonathan Cott, Simon and Schuster, NY, 1973.

[3] Ferdinand Ouellette, *Edgard Varese*, trans. Derek Coltman, NY, Orion, 1968. p.52

[4] Ruscoll writes:

Is [electronic music] this 'controlled chaos', this 'wild clumps of jagged sound, blips, squeals,' 'tonal ruptures and utter boredom', 'this aural nightmare', to use the words of various outraged critics, really here to stay? It seems to me that the answer is emphatically yes. .... the aural nightmare, the abyss of total freedom, is upon us, just like the Bomb. Neither is simply going to go away.

Herbert Russcol *The Liberation of Sound*   p.xxiv

[5] The concept of the sound object develops from the visualism of Western thought and its persistence in sound discourse can be partly explained by analyzing the familiar aphorism "seeing is believing." Belief is associated with knowledge, knowledge is embodied in theory and, as a quick look at etymology will show, the word "theory" is governed by the verb "to see". Associated with the Greek *théoria*, a seeing, is the idea of contemplation, which introduces the partitioning of phenomena into separate parts or categories in order to be viewed more closely. *Contemplation* is influenced by the Latin *templum*, meaning both a sacred edifice (cf. temple) and the "temple" of the head, and is associated with L. *tempus* — time divided into periods— as well as the idea of a delimited space partitioned off into a separate sector.See Eric Partridge, *Origins: a Short Etymological Dictionary of Modern English.*, Macmillan, NY 1966, p.711 "theory" and 701 *contemplàre*. For additional etymological readings see Mark Krupnick (ed.) "Introduction" in *Displacement:Derrida and After*, Indiana University Press, Bloomington, 1987, p.22

[6] Considering the concept of the sound event, it is instructive to look at the etymology of the word "aural", which, from the Latin *auris* : pertaining to the ear, derives from "aura", originally Greek for "air" and adopted by Latin as "a subtle, usually invisible exhalation or emanation."Partridge *Origins*, op.cit., p.636, "soar".

[7] Cage writes that when he was introduced to Fischinger:

He began to talk with me about the spirit which is inside each of the objects of this world. So, he told me, all we need to do to liberate that spirit is to brush past the object, and to draw forth its sound. That's the idea which led me to percussion.

Daniel Charles, *For the Birds* Marion Boyars, London, 1981, p. 74.

[8] "The phonograph...is a thing — not a musical instrument. A thing leads to other things"*Silence*, op.cit., p.125 Similarly, in 1952, when Cage first worked with magnetic tape, he discovered that sounds could occupy determinate spaces, measured in lengths of tape which corresponded to specific durations, and this correspondence was interpreted as a technologically motivated synesthesia , See Richard Kostelanetz, *Conversing with Cage* Limelight, New York,1988, p. 184

[9] See Websters *New Universal Dictionary* and Eric Partridge *Origins*, p. 552, "ray", op. cit.

[10] See Thomas A. Edison, *The Diary and Sundry Observations of Thomas A. Edison*, Dagobert D. Runes (ed.), Philosophical Library, New York, 1948; The Meta-Science Foundation "The Magic of Living Forever", audio tape, and Avital Ronell, *The Telephone Book*, University of Nebraska Press, Lincoln, 1989.

[11] Apollonio, Umbro, (ed.), *Futurist Manifestos*, Thames and Hudson, London, 1971.

[12] Ferdinand Ouellette , *Edgard Varese*, trans. Derek Coltman, Da Capo Press, NY, Orion, 1981.

[13] Varese, "The Liberation of Sound", in *Contemporary Composers on Contemporary Music*, ed. Elliott Schwartz and BArney Childs (NY:Holt, Rinehart and Winston, 1967) p.197

[14] STUPENDOUS DISCOVERY. SKY PHYSICALLY ABOLISHED. EARTH ONLY A MINUTE AWAY FROM SIRIUS. NO MORE FRIMANENT. CELESTIAL TELEGRAPHY BORN. INTERPLANETARY LANGUAGE ESTABLISHED.

Antonin Artaud, "There is No More Firmanent", in Antonin Artaud, *Collected Works*, Vol.2, Trans. Victor Corti, London: Calder and Boyars, 1971, p.85

[15] *Stockhausen: Conversations with the Composer*, Jonathan Cott, Simon and Schuster, NY, 1973. p.37

[16] Ibid

[17] Ibid., p.82

[18] Jacques Derrida, *Cinders*, University of Nebraska Press, Lincoln, 1987, pp.22-23, hereafter cited as "C"

[19] "Dissemination itself expresses in five words [*il y a la cendre*] what is destined, by the fire, to dispersion without return, the pyrification of what does not remain and returns to no one." *Cinders*, op.,cit., p.39

[20] "The best paradigm for the trace...is not...the trail of the hunt...the love of the step for its imprint, but the cinder." C.43 Note: Because of the extreme density of this very poetic work I will not attempt a reading here, nor a full elaboration of the term "cinder". The text, being overtly concerned with the holocaust, is laden with esoteric metaphors and difficult not to read in the light of Jewish mysticism. However, the parallels with Derrida's concept of "trace" and "space(ing)" are many, such that the cinder occupies the chiasmus between the signifier and signified allowing signification to occur, and also occupies the absence within the "is" (being) of the "there is" which cannot be named but only unconcealed through the cinder. [cf.Heidegger]. For instance: "The name 'cinder' figures, and because there is no cinder here, not here (nothing to touch, no color, no body, only words), but above all because these words, which through the name are supposed to name not the word but the thing, they are what names one thing in place of another, metonymy when the cinder is separated, one thing while figuring another from which nothing figurable remains." Ibid., p. 71

[21] Heidegger:"Do we stand in the very twilight of the most monstrous transformation our planet has ever undergone, the twilight of that epoch in which earth itself hangs suspended?...Are we to strike off on a journey

to this historic region of earth's evening?...Will this land of evening overwhelm Occident and Orient alike?" Heidegger, *Early Greek Thinking*, op. cit., p.17. The term *Arben-land* also appears in Jewish mysticism as the destiny of the Jewish people to face the land of the setting sun.

[22] The intimate radio voice creates, in Arnheim's words a '*Stimmung*' or atmosphere associated with the cosy parlour' on the one hand, and the 'Heavenly Father ... unseen yet entirely earthy' on the other.Rudolph Arnheim, *Radio*, NY: Da Capo Press, 1972, p.76.

[23] See for instance computer animation artists Monika Fleischmann and Wolfgang Strauss, *Der Prix Ars Electronica* catalogue, 1992, p.104, or Steve Aukstankalnis, David Blatner, *Silicon Mirage: The Art and Science of Virtual Reality*. Berkeley: Peachpit Press, 1992pp. 21-22.

[24] Kittler, "Gramophone, Film, Typewriter", *October* 41, Summer, 1987, MIT Press, p.102.

[25] Kittler, "Gramophone, Film, Typewriter", op.cit., p.118.

[26] Weibel, *Der Prix Ars Electronica* catalogue, 1992, pp.44, 66.

[27] Florian Rötzer, "Fascinations, Reactions, Virtual Worlds and Other Matter", *Book For the Unstable Media*, V-2 Orgznization, The Netherlands, 1992.

[28] Jean Baudrillard, "Virtual Illusion: The Automatic Writing of the World", lecture given at the Pwer Institute of Fine Arts, Sydney University, May 5, 1994.

MARGARET MORSE
Enthralling Spaces
The Aesthetics of Virtual Environments

Experiencing Virtual Spaces: Icarus
My first visit to virtual reality— a cartoon-like 'Virtual Seattle' at VPL Labs in California a number of years ago—indicated that for me at least, the great attraction was not the lure of computer technology or of interface devices, which included a cumbersome helmet ('eyephones') which put little video monitors over my eyes; and, the coarsely rendered, neon-colored artificial world, in which I had the illusion of being immersed was not a convincing imitation of the physical Seattle, or for that matter, any other landscape which could possibly have drawn me in. The allure of this cyberscape was the impression that it was responsive to me, as if my gaze itself was creating (or performing) this world and that I was to some extent enunciating it according to my own desire. My most abiding memory was of exhilarating ability to fly through the artificial world at great speed simply by cocking my hand like a gun—'navigation' is a poor term for this experience. Best of all, I had a sense of the weightlessness and super-power that I had imagined in childhood and had read about in myths and comic books, but had never before experienced, not even in my dreams. (My childhood friends in first and second grade and I tried fruitlessly to fly day after day by flapping blankets while jumping off walls and out of trees.) It is this feeling of transcendence of the mortal body and the gravity of earth that for me is a key to the desire and media attention which has been focused on 'cyberspace' and the subculture which has grown up around it.

In actuality, however, my field of view in the virtual world was constantly being reconstituted in 'real time' by a computer from a digital store through devices which tracked the position of my head and hand. ('Simulator sickness' and the disturbing experience of 'lag' between head-motion and image formation are clues to the inexact fit between a cyberscape and the body in physical space.) Despite its futuristic connotations, a 'world' like 'Virtual Seattle' belongs to the most traditional kind of virtual environment and may even be considered the last gasp of Renaissance space. However, the spectator's station point is inside the projection of an image, transformed from a monocular and stationary point of view into mobile agency in a three-dimensional space. Of course, this visual three-dimensionality is supported by sound—the most potentially immersive and virtual medium of all. I was fascinated with being both in the picture and having control over it—that is, I could chase a whale or follow restaurant sounds to the Space Needle landmark, whatever took my fancy, and when I got tired of it, I could tell the operator at the computer, 'Give me another world!'

Virtual environments could be liminal spaces, sacred places of social and personal transformation like the cave or the sweatlodge, if only by reason of their virtuality—neither here nor there, neither imaginary nor real, animate but neither living nor dead, a subjunctive realm of externalized imagination wherein events happen in effect, but not actually. A future transformation does seem to leak from cyberplaces, even though 'hype' or inflated publicity about them far outstrips technological developments. The very term 'cyberspace,' which after all was coined in the science-fiction of William Gibson, has been discredited and much of the practical discourse about the 'information highway,' or 'infobahn' is about disappointment and disenchantment. Yet the lure of cyberplaces re-

mains in the hint they give of something that is not quite there, at least yet—an escape or a change, but in any case, a response to the directive, 'Give me another world!'

The primordial virtual space is an utterly empty display, unlike the physical world, which is always 'full' and readymade. So far at least, cyberspace worlds are sparsely stocked with metaphors, now largely constituted from scratch with considerable graphic effort. Once these graphics are out of sight, it is easy to get lost in a void that is uniformly colored (usually black) and that wears infinity at its edges if not at a vanishing point. My first flight revealed Virtual Seattle, like most other virtual environments, to be relatively void but for a crude symbolscape of geometric objects. I remember my panic at flying through and out the swimming-pool-like image-space of Puget Sound and getting lost in utter emptiness. (I have also flown too far from the landingstrip metaphor of a Wall Street stock market program and have fallen off the checker-board world of 'Dactyl Nightmare.' The stock market program has an arrow function which points the way back to civilization.) What a comfort it was to find the traces of the human imagination in the spacescape near me again.

On the other hand, why are these cyber-traces, the externalized imagination of electronic producers, filled with so little of our cultural legacy? I am thinking of metaphorically and graphically impoverished architectural flythroughs or crude male-centered fantasies of pornotopia ('Virtual Valerie') or a pseudo-prehistoric past wherein the only activity is relentless killing, (for instance, the aforementioned 'Dactyl Nightmare.') One task of art that commodity culture apparently eschews is to resituate the disengaged space of virtuality into a socio-historical context. For instance, Jeffrey Shaw's interactive city installations, such as virtual New York or Amsterdam, are richly symbolic, suggesting how the built environment may be refigured in a image-space as a kind of alphabet. Multiple and interlacing historical narratives are traced in a kind of writing motion over the display area via a bicycle interface. The Biblical reference in Shaw's piece at ars electronica 94, *The Golden Calf*, made what was otherwise a clever piece—a statue visible only through a mirror-like electronic display—into a commentary on electronic art itself.

The uncanny and more sinister implications of my first flight occured to me later: A virtual space it is not just the ground or background or the landscape at which I look, or even that my look calls forth—that space looks at me, following my every move. Indeed, space constituted itself in response to various indices of my intention, for instance, the vectors of my gaze and the motion of my body or head. That is, in a virtual world, not just objects but space itself is interactive. As a consequence the virtual environment that surrounds the visitor itself can appear to be something 'live' or animate, 'that we cannot acknowledge as subject or persona in the traditional european sense, and which nonetheless constantly demonstrates that it sees us without revealing itself.'[1]

One implication is that cyberspace has the potential to be the most powerful and effective means of surveillance and social control, not merely of the user in cyberspace, but of the external material world, yet invented. The Gulf War revealed some of these implications more fully and drastically: blind to the actual world, viewing only a virtual display, a tank gunner or pilot activates a sensor and destroys a target marked on his heads-up display, on which the virtual and the actual look the same. Was his hit a simulation or the representation of an

actual event in physical space? Furthermore, the more realistic the virtual display, guided by a satellite positioning system, is in matching the world point by point, the more effective the gunner will be as an actual killing machine.

Of the many artistic responses to the Gulf War, I remember Frances Dyson's and Doug Kahn's sound and sculptural installation for its condensation of the sounds and images of birds in flight with the resonances of the air-war on Iraq. A more recent installation by Laura Kurgan explores the actual operation of several satellites in Global Positioning System or GPS by using them to trace the position of the New Museum gallery in New York. The installation was effectively demystifying, not only in revealing how this surveillance system works, but its material fallibility resulted in wavy deviations from geometric accuracy. Julia Scher has explored the psychical and cultural implications of electronic and computer surveillance in work spanning over a decade, including her 1993 installation, *Predictive Engineering*, at the San Francisco Museum of Modern Art, mixing live and recorded video on a two chiastically arranged and elegantly situated surveillance camera and monitor set-ups.

The interest of art then may not be in the seamless operation of electronic culture nor in the production of realistic virtual worlds—like Icarus, that may be flying so low as to be dragged into the sea. The often mentioned desire for photographic resolution in virtual displays may also have as much to do with the goal of controlling physical objects and events as it does with aesthetics. An art of virtual spaces which simply aims toward realism of fit or of appearance with a physical landscape may then risk merely serving the instrumental or hegemonic purposes of military and business interests in an information society.

On the other hand, art that surrenders to the allure of the mysterious or that seems to offer transcendence may find the wax that holds its feathers together melted by the sun. Exploiting the magical aura of virtual spaces risks satisfying the commodity and entertainment functions of information and nothing more. For, unlike prior illusion- producing modes, cyberspace is a means of enchanting not only liminal realms, but everyday reality. Even though it is has been discredited as a popular rather than scientific term, 'cyberspace' is appropriately built on the analogy of Norbert Wiener's cybernetics, or the study of feedback systems. In computers, feedback is elaborated into a programmed responsiveness which Sherry Turkle has noted, can captivate the user as a kind of 'second self'.[2] But feedback is not restricted to the space of the monitor, for material artifacts and even a physical space itself can be 'cyberized,' or granted agency by programming it to simulate some form of human interaction, in the process ultimately lending it qualities associated with human personality. As Jay David Bolter, explains in *Writing Space: The Computer, Hypertext and the History of Writing*,[3] 'Artificial intelligence leads almost inexorably to a kind of animism, in which every technological device (computers, telephones, wristwatches, automobiles, washing machines) writes and in which everything that reads and writes also has a mind.' One futuristic vision of the personified or *smart* home proclaims, 'Once your house can talk to you, you may never feel alone again,'[4] suggesting this animism and a quasi-subjecthood can extend to even physical space, once it has been 'cyberized.' A utopia of ubiquitous computing would enchant the entire world, distributing magical powers to the most mundane aspects of existence.

However, Perry Hoberman's interactive installation, *Faraday's Garden*, which allows the visitor to bring a graveyard of outdated appliances to life again suggests a far more sceptical view of technological innovation. Any realistic assess-

ment of the foreseeable development of computing power would dismiss a totally cyberized physical world as utter fantasy. Enchanted spaces and animated appliances are likely to remain a spotty and localized experience. Yet this very unevenness, this mixture of the virtual and the material, is itself disturbing to a sense of homogeneous order.

Of course, business interests are far more concerned with 'information' as a resource and an exchange value, than with virtual environments, even 'smart houses' per se. 'Information' is knowledge decontextualized and stored as data (that is, as virtual objects.) In order to be retrieved and placed in a new context, that data must take on symbolic or metaphoric form in an interactive and to some degree immersive display. The value of information is realized not just in any one state, but as a passage from the conceptual to the virtual to the material and back again, crossing through a variety of reality statuses. For instance, virtual money or credit demands a passage through material objects in order to increase itself as interest. Jeff Schulz, for instance, has made the credit system the material of his performance art and of commentary in his essay, 'Virtu-Real Space: Information Technologies and the Politics of Consciousness.'[5]

If virtual environments are best understood in connection with other social and cultural processes, as one stage in the unfolding of metaphors across a variety of reality-statuses and degrees of materiality, this suggests that the electronic arts are themselves part of a range or spectrum of interactive and immersive media and are not well-served by isolating them from art using other media, that is also concerned with the transformation of information societies into electronic culture. Artists from the ex-Eastern block or what was once the Third World are likely to suffer the consequences of this global change, even if they are excluded from its benefits. That is, there are artistic issues and perspectives which have a bearing on the global economic and cultural transformation we are undergoing that may be posed by those who have little access to computers or even to electricity —they must be welcomed into the discourse as full partners.

Artists and cultural activists—for instance, Paper Tiger/Deep Dish and Ponton—have also not forgotten the issue of public access to the material and technical level where information is processed, stored and transmitted. It is real estate in terms of data space on computer disks and in main-frames, personal space in seats in front of computer work- stations, frequencies on the broadcast spectrum, satellite space off which to bounce signals, and room in the bandwidth of fiberoptic cables that global corporations struggle among themselves to own and control. The scarcity and costliness of these material gates of entry limit the number and types of subjects we can find in the virtual gathering spaces of an electronic culture.

What we to some extent have and need more of is art which figures relationships between the virtual and the physical world, which demystifies the relation of the body to the virtual environment, and which is both a meta-commentary and an aesthetic statement. On the other hand, the technological ability to recreate the acoustic space of a medieval cathedral in one's living room, or to merge movie stars and tourists into the same image and have them interact, merely exploits the ability to superimpose the virtual over physical space: it is entertainment. The following section concludes by making some generalizations about virtual environments as virtual space, based in reflections on experience in cyberspace, from virtual realities to CD Rom work-stations to electronic networks.

The Engima of Virtual Space

The very idea of space becomes self-contradictory, when it is applied to virtual realms, especially the maze-like vectors and links which compose the paradoxical 'space' of networks. Virtual space is not so much space as 'nonspace,' for it need not occupy ground, nor be a continuous linear extension, area or void, nor even constitute the interval between things; and, unlike the material Lebensraum of earth, it not be perceived as limited or scarce. If the virtual space in question is the discontinuous, yet communal space of isolated computer network users, it can expand ad infinitum, like the text-based 'rooms' which make up a M.U.D. or multi-user dimension. But where is that noplace in which, for instance, two people talking by telephone meet? Where is the room and where is the display in which the hundreds who belong to the same M.U.D. (Multi-User Dungeon or Dimension) or M.O.O. (M.U.D., Object- Oriented) may gather? The reality-status of any one virtual environment is also unclear, seemingly in-between an exteriorized mental space, the apparatus of the image-display and the material world.

The many different levels and degrees of virtuality in an information society add complexity to mystery. What, for instance, is the 'space' of a virtual object in a computer program? Even if it can be quantified as data in megabytes or ultimately in bandwidth or pixels, a virtual object itself remains an imperceptible potentiality, which occupies no space at all until it is accessed and displayed. Can one even say the object is 'inside' the opaque casing of the computer or hidden under the obscure machine language of programming?[6] Even if one could break into the black box or extract and analyze the program, one wouldnUt expose the virtual object, only the mechanism that has the potential to produce it. Yet, the virtual space on display is still a realm of cause-and-effect, though the consequences of any one action may seem more magical than logical, for they need not be proportionate to the results to which we are accustomed in physical space.

Space is ordinarily conceived of as continuous or at least, at its most abstract, as a homogenous void. Yet, virtual non-space or cyberspace can be distributed discontinuously over physical space (in a way that is usually imagined as supported by ubiquitous computing.) Furthermore, physical separation between the users and objects of physical space need has little bearing on the seams which separate and link virtual spaces. What remains somewhat clumsy are the figural conventions which ease the passages between virtual 'worlds': the vortex, the window and the door are given too much work to do as metaphorical thresholds and passageways.

The additive aesthetic principle of the Internet, the global network of networks, is an extremely elegant, non-hierarchical, rhizomatic global web of relatively independent yet connecting nodes. Though it was conceived out of militaristic considerations, it might be compared with Panofsky's analysis of the gothic cathedral. This comparison is not trivial, for combined as an infrastructural and virtual entity, the Internet is among the greatest architecture the world has every known, far greater than the material reference point of the information highway metaphor, the freeway system.

More intriguingly, the use of computer networks is susceptible to crowd movements of far more variety and speed than can usually be studied in material space and ordinary temporal durations: the rise of a topic on the net, its ebb and flow, the attractors and repulsers of exchange are worthy of the attention

of theorists and artists. Such investigation would find its inspiration in the representation of the crowds or group protagonists in Eisenstein, Bunuel, Akerman and Altman's films, (though Riefenstahl's are too predictably regimented to be of much use in comprehending spontaneous movement and agency of groups.) Similarly, satellite experimentation of early video and time-lapse studies as well as in flocking algorithms and the statistical flows and ruptures of chaos theory are at a scale is that is cosmic or social at at the supraindividual level and in any case, not encompassed by traditional aesthetic principles.

Such compression of space and time finds an exponent in Jeffrey ShawUs interactive installation, Revolution. The user's effort turns a grindstone interface, which churns out pictorial representations of hundreds of social revolutions in the historical record onto a video monitor. Revolution is then not a representational space of linear histories or of geographical areas but the presentational space of a metaphor and its recurring metahistorical patterns. The visitor to the installation stands for the protagonist and motive force of this social phenomenon, a spontaneously acting group called at times the 'mass,' the 'crowd' or the 'people.' Then the vocation of an art of the kind that reflects on electronic crowds and networks is not the representation of the visible world, but the visualization of what is otherwise inaccessible to perception and is difficult to imagine because of its scale, its discontinuity in space and or time or its impenetrability—from the insides of the body, the atom, or the black box to the outside of our galaxy and our universe.

All the linking devices which create virtual spaces of greater and greater, albeit ephemeral unities—text-based networks, MUDUs and MOOUs, telecommunication satellite links and cables, but also protocyberspace like the nets which unify physical space—railroads and highways are understood, paradoxically enough as 'spaces.' Such virtual environments of discontinuous and overlapping jurisdictions would tax any political imagination capable of ethnic cleansing or of resolving ethnic conflict by dedicating bounded areas to one homogeneous culture. If virtual space were our model of political space, there would be no struggle for nationhood as a geographical entity. What would remain a nagging material problem is opening the gateway of induction into the virtual realm wide.

The concept of 'space' applied to computer- and other machine- generated virtual realms is a metaphor that invokes something quite different than the fundamental experience of being in the space of the physical world in a body rooted to the ground by gravity, in view of a horizon. Cyberspace is heterogeneous and dispersed, it can be experienced in various degrees of person and immersion and in different symbolic modes as a virtually embodied metaphor where the flesh (or meat body) can't go, but into which disengaged spectral bodies and multiple personas be inducted, fly and interact, alone in an electronic crowd. The scene itself can move and is responsive to the user in ways which promote performative and/or magical experiences, loosely covered in scientific and socio-economic alibis. That is, electronically produced liminal realms and induced experiences are only superficially about technology, they are about transcendence (even when in degraded forms of sex, shopping, high-speed driving, mortal combat, etc.) Some of the organizing metaphors of cyberspace (frontier, highway, spaceflight, cave, net, theater, game, etc.) are propositions which should be scrutinized carefully as to the way they define the control, access, reality status and experiences assigned to the virtual and symbolic realm which is increasingly our everyday world.

Notes

1   Friedrich Kittler, 'A Conversation between Peter Weibel and Friedrich Kittler,' in: *On Justifying the Hypothetical Nature of Art and the Non-Identicality with the Object World* (Cologne: Robert Fleck, 1992), p. 169.
2   In Turkle's *The Second Self: Computers and the Human Spirit*(New York: Simon & Schuster, 1984).
3   Hillsdale, New Jersey: Lawrence Erlbaum Assoc., 1991, p.182.
4   Bolter, p. 183, cited from *Futurist* magazine by Theodore Roszak, *The Cult of Information: The Folklore of Computers and the Fine Art of Thinking* (New York: Pantheon, 1986), p.35.
5   In: *Computer Graphics: Visual Proceedings* (ACM Siggraph, Annual Conference Series, 1993), pp.159-163.
6   Allucquere Roseanne Stone emphasizes opacity of computer packaging in 'Sex, Death and Architecture,' *any 3: Electrotecture: Architecture and Electronic Culture* (Nov./Dec.1993), pp.34-39. For Friedrich Kittler, the myth of user-friendly software generates a dangerous ignorance of machine language, which is in any case, a 'Protected Mode' in: *Computer als Medium*, eds. Norbert Bolz, Friedrich Kittler and Christoph Tholen (München: Fink Verlag, 1994), pp.209-220.

PHILIPPE BOISSONNET

Awareness of Limits (Galileo)

This is a multi-colour hologram with three levels of superimposed images that can be viewed separately or as simultaneous overlapping transparent image. The images are reconstructed in two different colour spectrums by three lamps. The illumination of each image is controlled by the spectator, who walks into or out of a motion detection area located in front of the hologram (ultrasound system). The system divides into three zones:

Zone 1: Outside the installation (blue-violet images)
Zone 2: Inside the installation (average viewing distance). The images are green-orange.
Zone 3: Inside the installation, but very close to the hologram. No lights go on. No images.

The phrase "Nulle part" (nowhere) is superimposed over pictures of the planet. This phrase is semantically connected to other words engraved on transparent or black plexiglass. The other words are "ici" (here), "là" (there) and "ailleurs" (elsewhere). The textual and iconographic reading is both spatial and temporal, with a focus on polyvalent linearity, since the five words can be read in any order. The

"Galileo" installation is in dialogue with my 1992 installation, "Gaia", in a relationship that is at once in opposition and continuous to the mythological reference – an archaic vision of the universe – and exact science – the modern vision of the universe.

PETER D'AGOSTINO, DAVID TAFLER,
VICTORIA VESNA:

Cyberspace: Configurations of Space, Memory and Language in the Electronic Arts

David Tafler: Meaning without mirrors: Mapping the Margins of Cyberspace.

Moving within a cybernetic world belies notions of the human body travelling through an electronic spacescape. In cyberspace, the horizon catches the mind indeed transcending the limitations of the body. Crossing this conceptual divide requires a radical language that articulates mental variations and possibilities without blocking them in space. Such a language will depart from many of the phenomenological standards currently used to trace virtual experiences.

Conventional notions of time and space have no meaning when moving through this new environment. Nevertheless, a one dimensional cyberspace seems unfathomable. Therefore, inside cyberspace schematics mask that world. Entry points become windows, electronic windows (CRTs, televisions) with a multi- dimensional facade. These portals translate the cerebral system into a sense oriented display. Eventually, the voyager sheds the constraints that have framed the imagination with the laws of the physical world.

This realization marks the real out-of-body revolution of cybernetics. It signals the end of cyberspace as an architectural construct and marks its beginning as a theoretical landscape. Information becomes commerce. Storage habitats require access platforms predicated on ethereal codes and signals. Coordinating the exchange of goods and services in the ether becomes a vital component of the material world. Materiality loses its meaning.

On this horizon, the scientist, artist, or theorist will depart from corpus paradigms when entering the ethereal matrix. Mathematical matrix models will replace turf maps when charting non-material investigations. This break with the past, ironically, draws the explorer back to a fundamental understanding of a world that predates the rise of Judeo-Christian thinking, and the glory of the Renaissance with its architectonic perspective.

In an earlier world, people lacked the stability of living within a comfortable space. No clear demarcation mediated the differences between an empirical science and a theological unknown. These people used their space, their light, the planet and the stars, as a fluctuating sign system through an unfathomable world.

Today, traces of the (Warlpiri, Pitjantjatjara, Pintupi, Arrernte, Alyawarre...) law remain. These civilizations offer an abundant resource for developing new tracking models for moving within cyberspace. All humans return to their nomadic roots when entering this cyber world. Requisite paradigm shifts require resuscitating latent frames of reference that will eventually lead to a new language. This revolution in thinking will have far reaching ecological implications.

Peter d'Agostino: VR as RV: an exploration of mind/environment. -
With the content and contextualization of new technologies shaping ever evolving perspectives of cyberspace, philosophical questions continue to emerge as to what is real and what is not, from Plato's Cave to this oxymoron called virtual reality. When foraging along the highways of electronic digital information, it becomes necessary to reframe and reconsider the inherent meanings and current uses of terms like virtuality, reality and actuality.

VR as RV is a new "critical virtual reality" (CVR) project intended to function as a metaphorical equivalent of CPR (cardiopulminary resuscitation)- a form of first aid for a dying body. In the context of a post-Cold War era, this work is an attempt to resuscitate a technological system that is still tied to outdated modes of an industrially based militarism. The theoretical framework for VR as RV incorporates Gregory Bateson's concepts of "an ecology of mind," and "mind/environment" with references to a superstring theory which postulates a ten dimensional universe with two parallel realities of four and six dimensions.

The critique inherent in this work is that recent hybrids of VR and online systems are creating hyper-theaters of the absurd, high- tech forums that are, ironically, analogous to the function and practicality of the "self contained comforts" of an RV (a motor home or caravan) :"Your recreational vehicle has been designed and engineered to provide youwith many self-contained comforts of home without having to be connectedto outside sources.... if operated within recommended procedures, [it]should provide you with many miles of virtually trouble free travel."

Charting this inversion of map and territory, VR as RV also addresses the erosion and possible reclamation of oral traditions that are firmly rooted in a past and still clearly manifested in the present. Alternative structures suggested by the multi-dimensional aspects of superstrings can also create links to indigenous cultures that may yield something beyond the sterility and predicability of a pervasive globally based high-tech culture.

VR as RV incorporates an immersive virtual reality installation that will be premiered at the Banff Centre for the Arts in August. An on-line component is planned for access on the World Wide Web during the ISEA Conference in Helsinki.

Victoria Vesna: The Wild West and the Frontier of Cyberspace

The spirit of the new frontier is still strong in the vast, yet unconquered spaces of the West Coast and the landscape itself prepares the humans inhabiting this land for making the transition to functioning within cyberspace. Driving down the freeway for hours daily develops an ability to parallel process movement through space and time with the higher thought processes functioning on a conscious level. The body is still, in a sitting position, with a simple task of automatic movement of the car and observing the few signs along the way while the subset of the mind operates. This is a form of active meditation that prepares one for navigation through cyberspace.

The vastness of the California landscape with all traces of history wiped out and the generic housing projects sprouting all over the place makes it impossible for one to internalize it and feel in control of it. When confronted with the artificiality of sites like Hollywood or Orange County and the immense surrounding spaces, it is easy to make the comparison to the newly evolving cyberscapes. These distances also necessitate the communication through the electronic space and it is by no accident that it was conceived in this part of the world where Silicon valley sits.

The inherent need to control nature manifests itself in the projection of visions of perfection that are in fact closer to a virtual world then that which is defined as virtual reality. Silicon, the same substance which is used in the production of chip technology, is used in redefining the human body, mostly women, and preservation of nature. Yet, when we delve deeper into the mysteries of the mind projected into the silicon chips, we once again return to the generative erotic—the Motherboard, the matrix. Here we find that the architects of the machine, no matter how unconscious, have left room for the feminine principle to participate in the creative process. Women are coming into the picture much later, but without any excess baggage of the past connections to war. The transmutation process involves the feminization of this mental space constructed by the masculine, inward looking mathematical process.

Using the installation "Another Day in Paradise," which is composed of three preserved, reconstructed palm trees (symbols of Paradise) with integrated monitors, I will explain the preservation process and compare the artificial geometries of the California landscape (and many similar new areas) which elide hidden indigenous patterns to the spatial relationships of cyberscapes under construction.

CHRISTA SOMMERER, LAURENT MIGNONNEAU

Anthroposcope

Anthroposcope is an interactive microscope, which connects the pulse of a human viewer to virtually growing and evolving micro-organisms in the viewfinder of a Carl Zeiss microscope. By attaching a small pulse sensor onto his finger the viewer will be connected to the microscope. This pulse sensor now analyzes the frequency and amplitude of the human pulse; data and information like speed of the heart beat, magnitude and strength of the pulse get measured. These data differ from viewer to viewer, they directly effect the growth and evolution of the virtual organisms living in the space of the real-virtual microscope.

By using the functions of the microscope the viewer now can explore these organisms. A fine and coarse zoom as well as the specimen plates movement in x-, y- and z coordinate will enable the viewer in the exploration and discovery of new organisms. These organisms evolve constantly different, since they are linked to the viewer's individual heart beat and pulse. Their rate of growth, their size and their movement are effected by the frequency and amplitude of the viewer's personal pulse.

The viewer acts as a randomizing factor, since the influence on his own pulse is certainly restricted. Still, he can try to change his pulse by breathing stronger or for example by causing more pressure in his blood cycle. The ability of using the microscope as well as the skill of influencing the own pulse will enable the viewer in the discovery of new worlds of micro organisms.

As a difference to the first version of "Anthroposcope" this second improved version contains virtual organisms that are not pre-defined but created in real-time through the viewer's pulse. The viewer will be able to focus upon specific organisms, he can "catch" them with the movement of the specimen plate and also zoom deeper inside them in order to explore deeper levels of organical growth.

All micro-organisms are three-dimensional, they move in space and react simultaneously to the viewer's decisions. In a way they directly react to the viewer, but are still somehow independent, since they are connected to the pulse, which follows its own rules.

The forms are characterized through "develepment in time", which means that they are created in real-time, without pre-design.This ability of real-time design is a feature that has been developed by Mignonneau & Sommerer also for the "A-Volve" interactive environment, where virtual organisms are created in real-time through the viewer's design. These animal like creatures live in the space of a water-filled glass pool and interact with the hands of the viewers in the water. The concept of real-time creation of forms as well as the combination of viewer's personality and the individuality of organical virtual organisms are characteristics for the "Artificial Biotope" created by Sommerer & Mignonneau.

Individuality is a main characteristics of life; it constitutes the minute differences between individual. All virtual reality installations of Sommerer & Mignonneau, as they are "Interactive Plant Growing", "Anthroposcope" and "A-Volve" deal with this relationship and work on the visualization of virtually living organisms that are produced and influenced by the viewers individuality and his personal decisions.

"Anthroposcope" is, so to speak, a counterpart to the installations "Interactive Plant Growing" and "A-Volve". Both installations reflect the individuality of several visitors at the same time, by producing a virtual environment characterized through the interaction between real and unreal, life and artificial life.

"Anthroposcope" is a virtual environment that is to be used only by one person at the time. In a way it is a more personal experience, since the viewer will interact and focus upon his own internal micro-organisms. In this enhanced version other viewers will also share this experience, they will be able to watch the images of the viewfinder on a large projection screen outside.
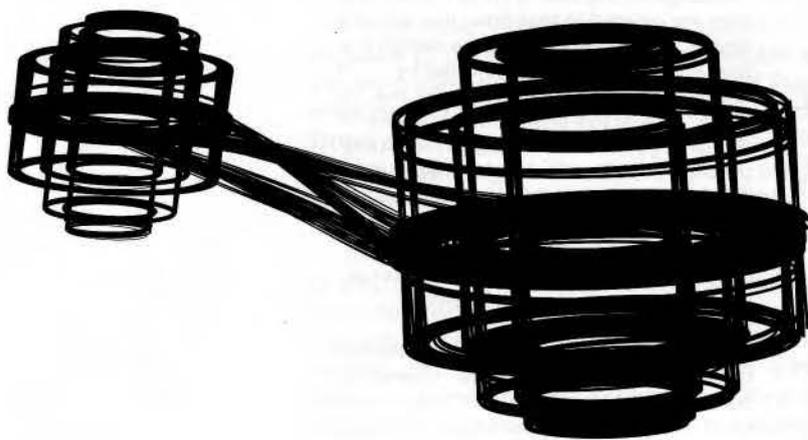
KNOWBOTIC RESEARCH
Dialogue with the Knowbotic South DWTKS

DWTKS: Dialogue with the Knowbotic South- strategies for a changing view on nature concepts; a map of a dynamic information-landscape providing a form of interaction with multi-local/-present data-fields in electronic networks.

Following the example of the manneristic representations of 4 Continents as 'Kunst-und Wunderkammern' by the Antwerp painter Jan van Kessel (1627-1679), Knowbotic Research (KR+cF) devises a knowledge space, a model of a Computer Aided Antarctica . In his series of four paintings, Jan van Kessel portrayed cultural knowledge representations of the four continents known in his day. KR+cF in its DWKTS installation, limits the material to the available computer-processed informa-tion on current antarctic research as it appears in public data networks. The immaterial character of these virtual antarctic 'substance' can only develop meaning and effectiveness (much as in the 17th century) if these items are developed in independent constructs, which never the less remain in distance but related to their antarctic reference subjects. As the given empirical facts are both real and fictitious, the data space give rise to phenomena which are difficult to conceptualize - a Computer Aided Reality.
We still lack the denotative tools to describe the development process leading from the real-world extraction of data to the emancipated operationality of these virtual spacecapes. KR+cF designs knowbots, devices operating as spatially and temporally dynamic interfaces for the observer's interactive navigation through the information landscape. These data-bodies incorporate data sets of current antarctic research projects, which symbol-ize direct real-time links to the reference subjects occurring in scientific research and the underlying natural events at the South Pole.

DTWKS - Installation offers the simultane-ous interaction inside and outside of the dynamic data map with multi-present knowbots. The visitor navigates parallel in a global area in the Internet as well as in a local computed model of the DTWKS environment at ISEA. Connected to a World Wide Web Server, the visitor, equipped with a virtual eye, can dial himself at a mobile terminal into the DWTKS project. He/she enters the territory of a 'virtual antarctica'. <http:/ www.khm.uni-koeln.de/kr+cf/ knowbotic _south.html>. This dynamic data map visualizes the effectiveness of data environments, and specifically the multifunctionality of the 'order imposing' knowbots, by transporting it from the immaterial data space of the Internet into the real space of the installation in Helsinki.

SPACESCAPES

NINA POPE

Herbaceous Protection, Unconscious Bloom, Keepsake

My work is rooted on computers and concerned with the idea of landscape. This is viewed in a broad sense, including imagined and real, external and internal, photographic and pictorial, existing and virtual spaces. I have become very interested in the play between these different types of environment and the effect the new dimension of computer space can have on our changing perception of real space and conventional representations of pictorial space.

ANNETTE WEINTRAUB

Night Light the Remanufactured Environment

Night Light is about the constructed environment. The images in this series are drawn from the landscape of industrial enclaves, highways and commercial strips unified by night and artificial light.They represent a mysterious and distorted world of exaggerated and unnatural color, reflected light, and fragments of illuminated signage. This landscape of factories and shopping strips is uninhabited, except for the blazing neon which accentuates its desolation and underlines a troubling separation from nature and the threat to environment, identity and community. Night Light constructs an animated environment of fragments, evoking the dynamism of an urban and industrial landscape lacking human presence. This fragmentation, and the process of layering and compositing, is the means of "remanufacturing" the built environment. The complete and intrinsic mutability of the digital fragment, ephemeral and ambiguous, moves beyond montage into the disintegration and reconfiguration of the image.

Annette Weintraub
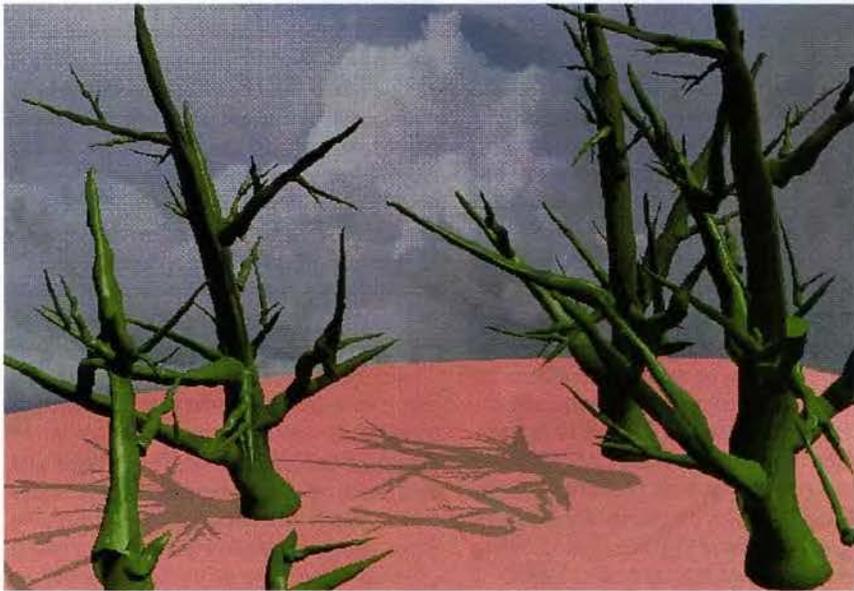
Nina Pope

SPACESCAPES

Nina Pope

ROY ASCOTT
The Architecture of Cyberception

Post-biological technologies enable us to become directly involved, body and mind, in our own transformation, and they are bringing about a qualitative change in our being. The emergent faculty of cyberception, our artificially enhanced interactions of perception and cognition, involves the transpersonal technology of global networks and cybermedia. We are learning to see afresh the processes of emergence in nature, the planetary media-flow, the invisible forces and fields of our many realities, while at the same time re-thinking possibilities for the architecture of new worlds.

Cyberception not only implies a new body and a new consciousness but a redefinition of how we might live together in the interspace between the virtual and the real, calling for a wholly new social environment and a reconsideration of every aspect of our ways of being.

Western architecture shows too much concern with surface and structures - an arrogant "edificiality" - and is too little aware of the human need for transformative systems. There is no biology of building. A city should offer its citizens the opportunity to participate in the process of cultural emergence. Its infrastructure, like its buildings, must be both intelligent and publicly intelligible, comprising systems that anticipate and react to our individual desires and needs as much as we interact with them.

A "grow bag" culture is required in which seeding replaces designing, and where architecture finds its guiding metaphors in microsystems and horticulture rather than in monumentality and warfare.

Currently, architecture has no response to the realities of cyborg living, or the distributed self, or to the ecology of digital interfaces and network nodes. It has produced a shopping cart world of pre-packed products wheeled around the sterile post-modernity of a mall culture. Buildings, like cities, should grow. As products of creative cyberception, they must become the matrix of new forms of consciousness and of the rhythms and realisations of post-biological life.

VITO ORAZEM
Holography as an Element of a Media Architecture

In its past history holography was an illusory medium. Although our eyes were never deceived by its representation of three-dimensional spaces. It was because of our experience with central perspective that we saw in it the great illusion of perfect space. Only after holography broke away from a representational subject it was possible to emphasise its immanent qualities as a medium, its close relationship to light and its optical properties. Freed from the encumbrance of trivial contents, it has become a material for creative light design.

Currently, there have been attempts in experimental architecture to include holographical material in intelligent buildings to direct the light and warmth and store the information. On the other hand, holographers since the late eighties have designed inner architecture with the help of holographic elements.

Walter Benjamin lamented in his "Passagen-Werk" that iron and glass in the middle of the 19th century "were to a certain extent discredited", because of this time it was not yet known how to work with these materials. The employment of holography today has similarities with this development. It is an unnecessary designing element in a Bauhaus architecture. Only after micro electronics were inte-

grated into building, the role of light and information in architecture changed. Light in media architecture is not only an essential design element, but becomes a vehicle for information. In the media architecture holographic optical elements are to be named along with electrochrome glass, large projection installations, LC-Displays and video monitors.

As a last consequence, not only do they direct and organize light and warmth, but at the same time, they produce information, alienation, embezzelment and conversion.

TOM KLINKOWSTEIN
Inventing an Aesthetic for the 21st Century: Post-Design means Electrotexture

The computer and the digital environment it has given birth to, ushers out fixed surfaces with fixed content and begins an era of variable surfaces, grafting, re-combining and customization (Electrotexture).

From the grid to the net. From metaphor to morph. From intended meaning to emerging meaning.

Input and Output devices that shape our mental models.

Art and design that is never finished.

Art and design that's a rumor. Art and design built to mutate.

Not Graphic Designers, but Knowledge Designers, Interaction Designers and Dialog Specialists, constructing environments which facilitate turning information into knowledge (Post-Design).

The new technologies of electronic agents, universal communication devices, the enculturated hypersurface of architecture and hypersonic transportation, lead to new art and design paradigms: art as communication replaces art as object; the dissolution of

the distinction between personal and public experience; the waning of the gravity aesthetic.

Post-design/Electrotexture means relinquishing the shared ideals of 20th Century modernism for the shared virtual experiential landscape of the 21st Century net.

MARKO PELJHAN
Ladomir-Faktura / Science of the Individual – The Mapping of Ladomir

The redefinition of social and individual terms and the subsequent materialization of their redefined status in new evolutionary conditions, demands appropriate physical, psychic and material preparation.

PROJEKT ATOL tries to enable the creative communication of individual forces to converge into a scientific/psychic entity, that would in it's last stage result in the creation of an insulated/isolated environment - space/time. Insulation/isolation is understood as a vehicle to achieve independence from, and reflection of the actual entropic social conditions. The environment will serve as a development surface for the further formation of new, creative social, spiritual and economic relations, based solely on integral individuality. LADOMIR-'faktura' is the first, training stage of the project pointing the way towards the achievement of final PROJEKT ATOL goals.

- Communication will be developed through technological, representational (awareness of fiction/non fiction) and pedagogical systems.

- Insulation/isolation autonomy (a new category) will be achieved through energy/material and space/time autonomy and independence.

-The de-materialization of logos will be replaced by the logoization of the material.

- Methods for the augmentation of maximum sensory awareness and sensory connection will be used throughout the work.

LADOMIR-'faktura' is not only a work of art (with the limitations of that term) but a progressive activity in time, based on the belief that ritualization of utopian conditions and forms and their projection in real space/time leads to concrete social evolution in the intermediate environment. This can then overcome the ever-actual discontinuity between categories of science/ technology/ physics/ art/ spirituality and in turn converge in a wider definition, an optimal landscape of free creativity and integral individuality.

The work is being developed in three stages:

- The first stage consists of the engineering and projecting process (structure planning, construction of instruments and gears, construction planning, artistic material planning, historical research, programming).

- The second stage is the particular materialization of these processes using and taking advantage of different media, (performance, lectures, data disks, publications, video, film) with the purpose of establishing a dialogue with a wider context.

- The third stage is the materialization of the LADOMIR-'faktura' modular autonomous construction and environment in nature, with open communication lines and memorization and reflection modules. With it, the mapping of LADOMIR will begin in real space/time and the observation and evolution of the science of the individual will take place.
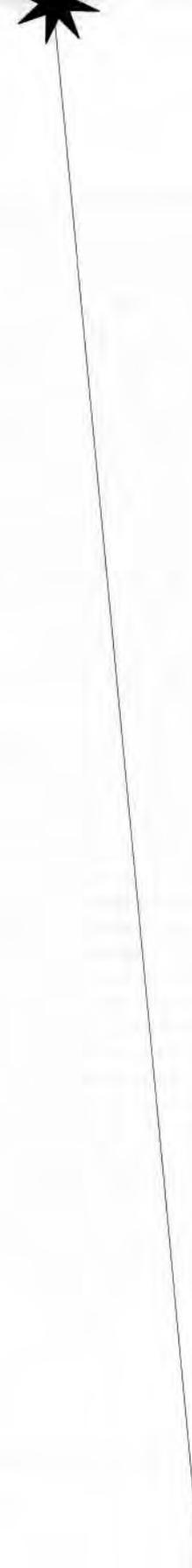
FREDERICK JOHN TRUCK, JEFFREY
SHAW, OLA ODEGARD, YUXWELUP-
TUN, CARL LOEFFLER

**The Invisible Planet: Networked
Virtual Reality, Virtual Cities and
Culture**

Carl Eugene Loeffler

This paper describes the networked
virtual reality application, Virtual Polis
a three dimensional city, inclusive of a
high-rise building, private domiciles,
art museum, stores and a park. Tele-
existence is an essential aspect, as po-
tentially the city can be inhabited by a
multitude of participants, each with
their own purposes. As much as a
grand social experiment, it also is a far
reaching graphical user interface
(GUI) for cultural experience, electron-
ic home shopping, and entertainment.
The city is discussed from technical, so-
ciological and semantic viewpoints.

The salient points of the virtual city
include:

~ a distributed, three dimensional
inhabitable environment

~ investigation of tele-existence in
a distributed virtual construct

~ capability of supporting poten-
tially unlimited participants

~ private spaces, property and
moral code

~ exploration of tools to alter the
environment, while inhabiting it ~ in-
terface (GUI) for home shopping and
entertainment

The premier of the Virtual Polis Version 2.0 prototype
was presented at Virtual Reality OSLO-94 where end
users explored the city, as a dynamic example of net-
worked virtual reality. The Virtual Polis is produced by
Carl Eugene Loeffler, STUDIO for Creative Inquiry,
Carnegie Mellon University.

Ola Odegard: Virtual Reality as a Medi-um for Social Interaction

This presentation will describe the
possibilities for social interaction be-
tween users and computer generated
agents in networked Virtual Reality
applications.

In many ways networked virtual worlds can be described as social experiments. Since it is networked, it will be inhabited by persons that have had no previous personal contact, and have to learn to interact, and develop conventions for behavior within the virtual worlds. This also puts the awareness on the responsibility of the developers of VR applications, as they as the interpreters of cultural and social codecs. Virtual Reality can also challenge the traditional role of users of different media. First of all the user can walk around in the virtual worlds as a spectator, just watching, like a visitor. On the other hand computer generated agents can be programmed to follow a dramatized sequence. The user can first of all watch this sequence as a linear story, like traditional TV. But the user will also be given the possibility to interact with the agent role, and influence the sequence of actions. The third level is for the user to virtually inhabit the agent role.

The user perspective in Virtual Reality is based on the work related to Virtual Polis Version 2.0 and a reconstruction of an ancient viking settlement, Virtual Viking Village Version 1.0, both of which were premiered at the conference Virtual Reality Oslo 1994.

Jeffrey Shaw

I will present two recent 'televirtual' projects - TELEVIRTUAL CHIT CHAT by Jeffrey Shaw and THE TELEVIRTUAL FRUIT MACHINE by Agnes Hegedus. Both works were produced at the Center for Art and Media (ZKM) Karlsruhe, Germany, and the application software was written by Gideon May.

TELEVIRTUAL CHIT CHAT was a telematic installation between the IMAGINA in Monte Carlo and the ZKM in Karlsruhe in 1993. Players at both sites communicated in a shared visual space generated by Silicon Graphics computers linked by modem. Players could choose letters from the alphabet and manipulate their shape and spatial position so as to create shared and interwoven word- architectures on top of a game board that represented the geographical space between Monte Carlo and Karlsruhe. The work evokes a metaphor for all those 'first words' now being projected into cyberspace.

THE TELEVIRTUAL FRUIT MACHINE was a telematic installation between the NIT/IC'93 exhibition MEDIA PASSAGE in Tokyo, and the ZKM exhibition MultiMediale 3 in Karlsruhe in 1993. Players at both sites communicated in a shared visual space generated by Silicon Graphics computers linked by modem. An ISDN videophone link also enabled the players to see and talk to each other. Each player controlled the spatial disposition of half of a spherical object, mapped on whose surface were images of various fruits. The goal for the two players was to join the respective halves of this sphere, and their success would be rewarded by a shower of virtual Japanese or German coins - evoking those ubiquitous gambling fruit machines as well as fruitful intercourse.

Lawrence Paul

Lawrence Paul's Long House project was created to communicate an understanding of 1st Nation People's belief systems to a multi-cultural world. He uses the technology of virtual reality to translate how he sees and experiences things to those not of his culture.

Fred Truck will act as moderator of the panel, introduce the panelists, and give a very brief overview of the city as an image and metaphor, as well as explain the city as it is being used now as a metaphor in virtual reality.

CHRISTIAN MÖLLER
Audio Pendulums

Audio Pendulums is an interactive sound installation for the outer facade of the Lasipalatsi (Glass Palace) in Helsinki.

The seven audio pendulums are steel pipes, 11 meters long and painted blue. They are suspended in front of the building at 5 meter intervals. A video camera mounted outside transmits a picture of the audio pendulums swaying in the wind to a computer system, which then generates a digital image of the movement. The computer program thereby records the movements and transforms them into audio signals, the volume of which depends on the extent of the movement. Each pendulum is allocated a tonal surface on the pentatonic scale. The result is an electronic audio environment which blends with the existing natural sounds, such as rustling leaves, the voices of passers-by, street traffic, etc. to generate an overall audio experience.

Programming: Daniel Schmitt, Sven Thöne
Sounds: Peter Kuhlmann
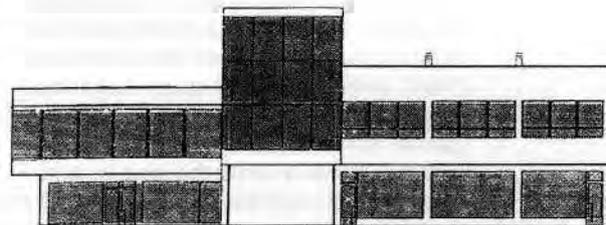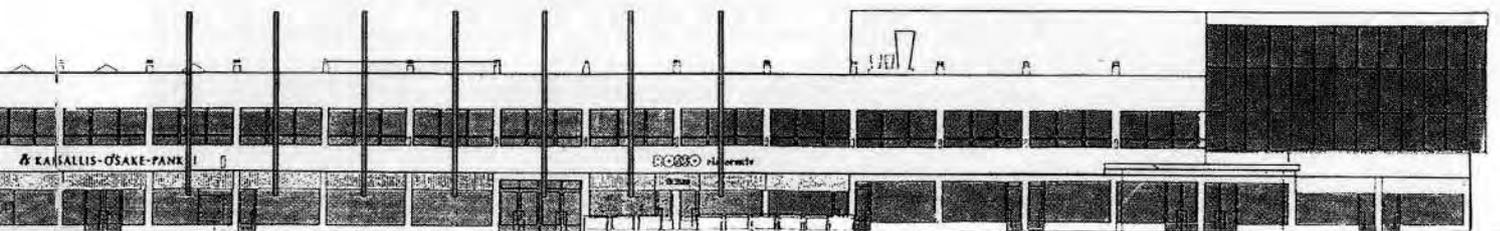
MATHIAS FUCHS
The Relation of Architecture and Electronic Space

Chairs, tables, staircases, windows and doors are elements of a vocabulary belonging to the language of architecture. It seems a strange thing that these terms have been taken over by the emerging language of "Electronic Space". Virtual space installations like "Sound Arch", (Bernhard Leitner), "Huxley's Door" (Ruth Schnell), "The Legible City" (Jeffrey Shaw) or "Columnism" (by the author) use elements of an architectural language. By analogy to organic architecture (Eero Saarinen, Charles Eames et al.) which picked up concepts from biology, we might now speak of "Architectonic Electronics".

This does not mean, that electronic space will supply a brand new set of doors, chairs and tables (like organic architecture did not build new kinds of animals), it just means that in the paradigmatic shift from a world made up of bricks, wood and concrete to a world shaped by data-structures, we still feel bound to the formative im-

perative of physical laws, concepts and restrictions. The terminology of computer science and computer business points to the same direction: "Desktop", "Windows" and "Gates" illustrate the notional inclination to mingle abstract concepts with concrete architectonical components. In accordance to Thomas S. Kuhn's thesis about the structure of scientific revolutions one would have to suspect that architectonic space and electronic space are incommensurable. We might use words like wall, window or door in each of those spaces, yet the words mean completely different things in each of them.

The link between the old and the new paradigm of space is built upon a contradictory set of terminological items. Whereas computer business wants to make us believe that nothing has changed, that we still sit in front of the desktop, have the paintbrush in our hand and look through the same old windows, computer art makes us aware that nothing is the same any more. We are facing the doors, the gates and the whole furniture, but we have already left the house.

SYLVIA ECKERMANN,
MATHIAS FUCHS
Link

Stairs are links between architectural units.
They serve as an interface between inside/
outside, up/down. In this sense a staircase
is a passage, a transitional space rather
than a room of its own. It is a space of
movement.

The project series LINK, started in Bolzano
and Vienna in 1993, attempts to draw
attention to specific localities. At the
staircase of the Museum of Contemporary
Art in Helsinki the sounds of walking
people, which are usually audible on the
stairs, will be superimposed by sounds
especially designed for the circumstances.

By covering the staircase with an orange
carpet the visitor is confronted with a new
sensual impression when walking up the
stairs. Not only his auditory environment
has changed - his visual and his tactile
surroundings have been altered as well. As
a consequence the visitor's perception of a
well known place is altered fundamentally.
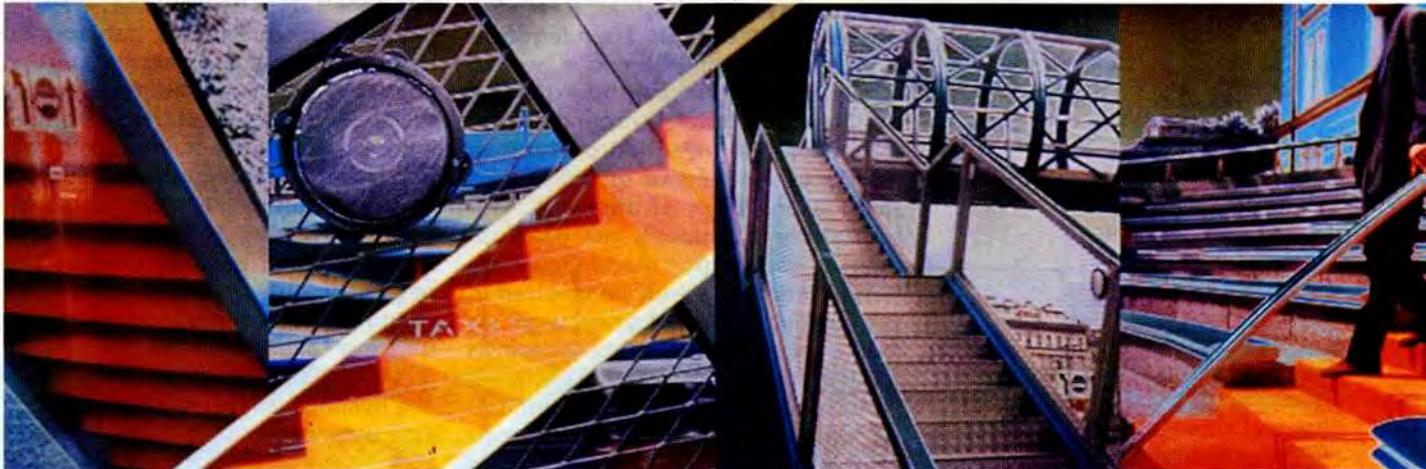
body

MONIKA FLEISCHMAN, WOLFGANG STRAUSS, CHRISTIAN BOHN
The Dice Time of the Dynamic Space

Face of the Body / Interactivity
The process of visual thinking does not only involve the eyes and the brain, but also the whole body. The body supplies spatial experience that is subsequently translated into reality by the hand. " The hand is the exterior brain of man" (Immanuel Kant). Hand, body and eyes are the interfaces in the process of perception. The identification with the computer as a 'second self' (Sherry Turkle) can be explained by the active control through special interfaces. The invention of intuitive interfaces - immersive or not immersive - is one topic of our work. Our special contribution is the development of imagination machines, where performers can actively be involved in the creative process of a new work. As media artists and computer scientists we take the chance to work with expensive high powered equipment. Developing prototypes to explore their technical possibilities we discover the cognitive and philosophical implications of interactive virtual environments.

The body as interface and representation "Liquid Views" and "Rigid Waves" - two interactive installations (1993) - are based on the myth of 'Narciss'. Narkissos is the myth of the profound present when man looks at himself and questions himself. The fountain, sole element of the setting in "Liquid Views", is a symbol for the universe. Touching the 'water surface' of the liquid mirror the viewer distorts his telematic reflection. The computer turns the mirror into an active agent. Approaching 'Rigid Waves' the viewer perceives an 'impressionist' painting of a mirrored room. Coming closer, the painting is transformed into an increasingly realistic picture, and sounds can be heard. Once the visitor has come close enough he sees his reflection in the mirror. Acting in front of the mirror, the becoming performer interacts with the reflection of his body.

In both installations the video images of the observer are mapped into a fluid sphere of digital imagery. Through gestures or body movement the viewer changes his virtual image, which originates on the other side of the mirror - the side we normally cannot penetrate. The view that we usually hold of ourselves is transformed by real-time image processing. Virtual images change in a metamorphic way driven by the action of the performer. Immobilized between the life of action and the life of contemplation the disorientation in this works as an experiment aiming at orientation in a world of fluid, reactive images. The perception of space and time are changing. Enter the age of visual thinking - experience the dice time.

The dynamic perspective in spatial environments
The dream of the ultimate medium, that uses all channels of human perception has guided the efforts of interface design towards Virtual Reality systems. The computer with its connected sensors and reaction devices represents an responsive environ-

ment. The design of the virtual environment "Responsive Workbench" is the result of a joint attempt of computer scientists, media-artists and architects.

With stereoprojections not only one, but several viewers experience the third and fourth dimension of virtual worlds. Drawn by the attention of the onlooker the world of objects acts as interactive moving sculptures. By using a sensor, fixed on the stereoglasses, the viewers body position and orientation data are connected with the movement of the images. The movement of body, eyes and hand correlates with his view. Stereoscopic images combined with spatial interaction present their results in the virtual model. This reciprocity - provoked by the movement - provides a new dynamic perspective, opposite to the static Renaissance perspective.

Seen, experienced, and designed in motion by the human, generated by the computer as constantly changing viewpoints - the dynamic perspective provides diced sequences like in the movies. Moreover, the observer plays with the perspective and develops a spatial, choreographic relation to the reflection. The seeing becomes a conscious experience of space like we know it from dance theater.

This dynamic space produces a contemplative environment for thinking and working intuitively, because of the incorporated artificial neural network tools: a word recognition system for natural speech, and a gesture-recognizer for the finger position data coming from a CyberGlove. The viewer acts as a 'complete person', using his body as interface for the Dynamic Perspective. The computer is - invisible - integrated into the human world. The desk was the metaphor for this interface, but the projection plane could be every part of a certain space. So far, Virtuality is a condition, where real space is overlayed with virtual space. The real space is the envelope of the dynamic space. The quality of "Responsive Workbench" is the combination of visualization, interaction and imagination leading towards a new quality of perception.

Referring to the dynamic space, two other works will be introduced - The Second Self and The Spatial Navigator.

JANE GOODALL
High Anxieties

Never use the words higher or lower. (Charles Darwin)

When, over a decade ago, Stelarc flew naked over the roof of the Theatre Royal, Copenhagen, suspended from the arm of a giant crane, he looked for a moment like Superman. He came to ground again to talk of obsolete bodies and of a new order of post evolutionary being for a species whose fusion with its own technological productions was imminent. But Stelarc has also admitted to experiencing a certain anxiety up there, high over the city, as he heard his own skin creaking in the wind. Few people could watch or even contemplate this spectacle without a sense of vertiginous anxiety, but vertigo may be only one element in the complex of anxieties that may be associated with a critical experience of height.

As high technology raises the evolutionary stakes and gives us visions of the post-, trans- or superhuman species, we are haunted by the master-slave connotations which the machine-human relationship has acquired in our cultural history. This history has taught us that the high/low distinction is hierarchical , but also that hierarchies are violent, and violently reversible.

This paper is concerned with the high/low distinction in the co-evolution of human and machine, and with the thematics of struggle, domination and destiny which inevitably attach to this distinction in Western traditions. It speculates on the possibilities of evading high anxieties through the evasion of hierarchical terminologies and their attendant thematics. Such evasions are being successfully negotiated in the work of certain artists, notably Australian performance artists Stelarc and Sue-ellen Kohler . These two artists, working respectively at the 'high' and 'low' ends of the technological spectrum, are rediscovering the spacescape of the body in ways which disrupt its vertical axis and raise fundamental questions about its status as 'human'.

TIMOTHY DRUCKREY

Networked Identity, Creativity, Language and the Clash of Realities

While immersive virtual reality dominates discussions of the possibilities and dilemmas of identity and the cybernetic body, a discourse burgeons in bulletin boards and on the internet about the issues of gender, identity and technology in terms of the relationship between textual language and telecommunication. The issues raised in these forums range from gender switching to the politics of rape. The overwhelming growth of the internet population has recently generated what could herald the need for the regulation of behavior raising many issues about free speech, the material effects of language, and the presumption that cyberspace is a neutral zone exempt from responsible agency. The internet is increasingly conceived as a community where words and actions are tangible.

Touted as a cure-all for every sort of distance, the net exposes some of the deepest frailities in the relationship between presence and meaning at the same time that it offers (at least now before it is regulated) access to communities whose interests are specialized and dispersed. Beneath the zeal to simultaneously create and exploit a developing technology, exists a collapsed set of assumptions. The most important of these believes that communication in cyberia is going to be an electronically adapted form of communication via the phone, modem, or through the television. And while it is clear that grounding these ideas is a logic of commodification, production in cyberspace will require a wholly revamped consideration of exchange mostly having to do with the consequences of language. Indeed, the seeming immateriality, and hence inconsequentiality, of language in cyberspace permits rapacious ex-

pression to dangle between moral relativity and rationalized simulation. At issue is not the difference between seduction and abandonment, illusion and simulation, fact or fiction, the Real and the virtual, but the logic of a system that either links the two as oppositional or that fails to theorize the symbolic as deeply consequential.

This talk will attempt to unravel some of the consequences of the use of languages of identity, gender, sexuality, and politics in the not-so-virtual environment of the networks.

KARI A. HINTIKKA
Virtual Identities - Inhabiting the Net

Virtual Identity (VI) is a new phenomenon in the media society of the Western or industrialized world. VI is like brains, age or physical body - everyone has it.

Commercial companies and public administration have created personal data files of all of us, including our level of education, credit card numbers and so on. At the moment both the commercial and the administrational datakeepers sell our personal info to the market, a pile of raw info of the potential consumer. Our identity and personality have been commercialized. But in the Net we can tailor our VI as we wish. Typical Net identity hacking is to try to emulate the opposite sex than the user is in real life.

The Gibsonian cyberspace does not exist yet, but it has been realized by pilots and projects like Abbeye de Cluny, DOOM, Habitat, SIMNET, Virtual Art Museum and Virtual City. When cyberspace will come into existence, it will provide a whole new medium to express our thoughts with 3D visualization - a little like the 2D cave paintings for the ancient humans. In cyberspace, you will be able to send 3D animations/pictures instead of the very gesture-restricted email. As inhabit-

ants of the cyberspace, we have to remember that digital space can not satisfy our physical needs for food, drinks, sleep or personal hygiene. Other forms of 'life' will habitate the cyberspace more efficiently.

Agents, butlers and personal digital assistants (PDA) are personal, profiled programs, which 'learn' the routines of the human user and after learning it will do tasks autonomously. The robot researchers of MIT leaped on to the next generation in the 1980's, inventing that a robot needn't make preprogrammed tasks – it enough for it just to survive. This means that if the efficient computer program 'wants' to survive it might reject its original task-making and 'decide' to behave unexpectedly. In the Net history we have the example of R.T. Morris and his worm of 1988. And this was a mere coding mistake, to begin with.

'When all the phones in the world ring at the same time, you know I'm alive.' What if the purpose of human life is just a step towards the evolution of a-life and other ture-habitants of the cyberspace..

ERIC KLUITENBERG,
ARTHUR ELSENAAR
Corporeal-Machine-Anxiety

The Technologization of the Human Body
The human being likes to consider itself as a cultural and spiritual entity, removed from the rest of nature. This 'split personality' is reflected in the dualist perception of the universe that can be associated with Descartian philosophy and its followers. It clearly differentiates the realm of the physical and the spiritual from each other. What however inescapably links human beings with their natural envi-

ronment is their physical body. As the Cartesian program progressed it became increasingly clear that the physical and the spiritual realm could not be separated from each other as clearly as expected. In the Cartesian tradition nature, and for that matter also animal-life, was considered as a gigantic mechanical system. Consequently the human body also became to be seen as a machine. But here an odd twist occurred. As it became clear that much of our psychological performance depended on our physical state (the body: a machine), then our psychological states should be considered the result of the states of that machine and its intricate mechanisms.

This idea, scorned when first proposed, served perfectly to legitimate a liberal ideology that would enhance the technologization of human life through the industrialization of the 18th and 19th century. At the same time the model cleared the way for an unsurpassed growth of medical research and discoveries. At present medical technology has advanced to a degree where we seem to be in sight of the ultimate aim of the Cartesian program: seeing all, knowing all, realizing all. The body can be (genetically) constructed and deconstructed in almost every conceivable direction. At the same time the body is immersed in an increasingly technologized environment. This ruthless invasion of the body scares many people, but it is left largely unquestioned at the conceptual level.

SPACESCAPES**body**

KAREN DAVIS
The Imaginary Subject and the Virtual Body in Corporate Communication

The close examination of communication artifacts can reveal much about the constituent elements of culture, values and the institutional contexts within which we function. In this presentation, the subject of inquiry is the repository of in-house corporate videobased communications utilized in training employees of the Bank of America Corporation. Through an analytical critique of information technology within the corporate environment, the grammar of these communications is exposed for its implication of an imaginary subject: the virtual corporate body. In-house communications, particularly videocommunication and specifically 'training tapes', are considered as the manifestation or enunciation of the virtual corporate body, and also as the originary site of the imaginary within the institution. The presentation is a summary of two essays on information technology and institutional reification appearing in the American periodicals, 'Afterimage', 'Video Networks' and in the upcoming City Lights Press book, Un-Wired.

KATHY ROGERS, ROB LA FRENAIS

**Non-explicable phenomena,
consciousness and technology**

We aim to progress the debate about the possibility of machine consciousness towards the implications of the actuality of elements of consciousness emerging from outside the human situation. We will bring together work done by artists and scientists on dream states, out of body experiences, near-death experiences, brain machines, and the use of light and psychoacoustic sound to affect the human capacity to visualise and imagine.

Using these examples we will examine specific 'phenomena' such as hauntings, geomantic disturbances, UFO sightings, 'abductions' and contacts as have been reported as being apparently genuine and investigate whether the artist can interface with these in some way without being drawn into the opposing camps of belief and scepticism.

We will examine the implications of the western desire for a technological 'other' whether it be as emergent machine intelligences, extraterrestrial visitors, or parapsychological phenomena.

Using virtual reality and the more complex technology of the body as a starting-point, we will look at attempts to simulate 'models' for these phenomena and how they reflect human culture, both conscious and unconscious.

As people whose principal concern is art we are not prepared to judge the legitimacy of specific phenomena. The fact that 'something' is happening 'out there' and the processes which humans have to undertake to understand 'it' is more interesting than photographic 'evidence' and conspiracy theories about government cover-ups. We would prefer to offer the possibility of the concept of clusters of 'leakages', whereby non-explicable phenomena enters the conscious perception on a random and accidental basis.

Kathy Rogers on her work: 'I am researching into into the remote replication and extension of human perception, cognition and human presence. I am also looking at the practical and theoretical aspects of the parasciences and identifying ways in which telepresence technologies might allow us to distribute persistent manifestations of identifiable personal energy. I propose a synthesis of recent developments within the study of dreams and the paranormal phenomena such as ESP, hauntings, lucid dreaming and nightmares to push us towards a pluralistic understanding of the deeply imagistic capacity of human consciousness. I use the metaphor of the void to elaborate on the absoluteness of inner space that each human being possesses. '

SPACESCAPES**body**

CATHERINE RICHARDS
The Virtual Body

The Virtual Body is at once a scientific instrument, an aesthetic object, and a postmodern magic box. It simulates the rococo salon in miniature and extends the rococo intoxication and upheaval of the senses into the new technological condition.

The solumn sitting in the room with its pulsing, vibrating, glowing box beckons the viewer to peer into the top, only to be met by his or her own eye peering back through the ceiling. The gradual shift from ceiling to tracking floor collapses the space, causing the spectators to fall into, travel within, and lose themselves inside the phenomenon.

With this magic box there is an erasure of physicality, as if not only the room has collapsed, but also our knowledge of the body within space.

This twist engages and traps the spectator who becomes at once spectator/object, participant/subject, creating an intense and new aesthetic site.

STELARC
Stomach Sculpture
Hollow Body, Host Space

1. SKIN: SURFACE/SELF. As surface, skin was once the beginning of the world and simultaneously the boundary of the self. What senses the world also becomes the means by which the body becomes inscribed. But now stretched and penetrated by machines, SKIN IS NO LONGER THE SMOOTH, SENSUOUS SURFACE OF A SITE OR A SCREEN. Skin no longer signifies closure. The rupture of surface and of skin means the erasure of inner and outer. THE SHEDDING OF SKIN...

2. INTENTION: INSERTION. To position an art work inside the body. An electronic structure in an internal tract. The body becomes HOLLOW, with no meaningful distinction between public, private and physiological spaces. Technology invades and functions within the body NOT AS A PROSTHETIC REPLACEMENT, BUT AS AN AESTHETIC ADORNMENT. As a body, one no longer looks at art, does not perform as art, but contains art. THE HOLLOW BODY BECOMES A HOST, NOT FOR A SELF OR SOUL, BUT SIMPLY FOR A SCULPTURE.

3. STRUCTURE: MOTIONS/FUNCTIONS. Fabricated with IMPLANT QUALITY metals such as titanium, stainless steel, silver and gold, the sculpture is a domed capsule shell containing a worm-screw and link-mechanism. It is actuated by a flexidrive cable connected to a servomotor and controlled by a logic circuit. The capsule opens and closes in three sections EXTENDING and RETRACTING. An instrument array light and piezo buzzer make the sculpture self-illuminating and sound-emitting.

4. PROCEDURE: PROBE/EXTRACT. The stomach was emptied by withholding food for about 8 hours prior to insertion. The closed capsule, with beeping sound and flashing light activated, was swallowed and guided down tethered to its flexidrive cable to the control box outside the body. ONCE INSERTED INTO THE STOMACH, AN ENDOSCOPE WAS USED TO INFLATE THE STOMACH AND TO SUCK OUT EXCESS BODY FLUIDS. The sculpture was then arrayed with switches on the control box. Documentation was done using video

endoscopy equipment. Even with a stomach pump, excess saliva was still a problem, necessitating hasty removal of all probes on several occasions...

5. SPECULATION: INTERNAL/INVISIBLE. It is time to recolonise the body with MICROMINIATURISED ROBOTS to augment our bacterial population, to assist our immunological system and to monitor the capillary and internal tracts of the body. There is a necessity for the body to possess and INTERNAL SURVEILLANCE SYSTEM. The internal environment of the body would contour the microbots behaviour, thereby activating particular tasks. Temperature, blood chemistry, the softness or hardness of tissue and the presence of obstacles in tracts could all be primary indications of problems that would signal microbots into action. The biocompatibility of technology is not due to its substance but to its scale. SPECK-SIZED ROBOTS ARE EASILY SWALLOWED AND MAY NOT EVEN BE SENSED! At a nanotechnological level, machines will navigate and inhabit cellular spaces and manipulate molecular structures.

SPACESCAPES**body**

KIRK WOLFORD, STAHL STENSLIE
CyberSM III

"CyberSM III" uses the human body as the interface for a dialogue through touch. To further complicate matters, the participants in this dialogue are physically separated. They must carry on this dialogue over the Internet.

In the installation, participants at 2 locations wear suits connected to each other over the Internet. These suits contain hot zones which generate various forms of physical stimuli and sense the touch of a participant's hand. When a participant touches one of the zones on their suit, several things happen: the local computer sends a message to the remote computer telling where, and with what intensity the participant has touched the suit; the remote computer then starts a stimulus in the same area, and with the same intensity as the local touch, i.e., the computers send the touch across the network, and continue it through the remote suit. The computers then enhance the local participant's perception of the touch with sight and sound. A display projected in front of the participant shows the location and intensity of the touch, while the computer plays sounds corresponding to the touch. Once the local participant removes their hand from their suit, the computer enhanced touch continues until that zone is touched again.

Participants can control the intensity and location of these touches by touching their own suits in varying manners, or they can speak to the remote participants, and ask to be touched in other ways.

The "CyberSM III" installation creates a full environment of touch, images, and sound, but the interaction, the dialog, takes place only through touch.

STAHL STENSLIE
Liquid selves - Schizoid bodies

This presentative will explore aspects of visual personality design in virtual environments. It will also examine "non-linear", liquid" aspects of designer personalities.

To have a visual and virtual personality representing oneself will soon be common within cyberspaces. The ability of presenting oneself visually to others in networked communication poses new challenges of personality design. Looks, abilities and the nature of bodies can in cyberspace be subject to constant change. In "real" life we act differently according to the different situations without changing our visual appearance much. In cyberspace appearance and behavior can relate to each other in ways not experiential in real life. Virtual stand-ins will change the perception of ourselves in ethical, aesthetical, cultural, sociological and political ways.

The field of virtual reality has created ways to re-design the body, both through images and text. The disturbing possibility to change the re-presentation of oneself in (almost) real time will be familiar to those who have visited MUDs.

The new virtual body is no longer the static, modernist kind of body, but a floating, changing and creative kind of framework. The fluid features of such a body-framework is found in it's (potentially) open ended, constantly changing and mutating qualities.

The fabric of cyberspace allows primarily for fantastic experiences to take place. Rather than trying to duplicate "reality", as is the most common design of virtual environments today, future environment designs will take advantage of the hallucinative potentials of cyberspace. As an artists playground, virtual space allows for the design of extreme environments and fringe experiences. Perception through a schizoid body in cyberspace makes all the more sense.

SPACESCAPES**body**
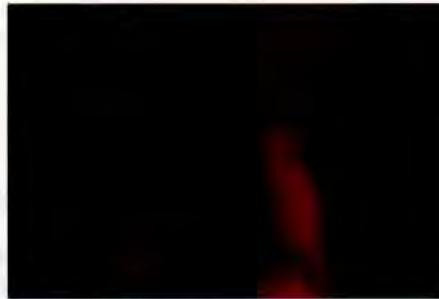
BENOIT MAUBREY
The Audio Ballerinas

Electronic clothes and audio uniforms

In 1982 Benoît Maubrey started building Audio Jackets in Berlin. These electro-acoustic clothes (30 watts, 12 volts) are individually equipped with amplifiers, loudspeakers and batteries that permit the wearer to use a variety of electronic instruments: their principal musical "tool" is a digital memory that works like a sampler and permits them to record, amplify and play back local sounds instantaneously. Additionally, they can plug in "Walkmans" with pre-recorded cassettes, radios, contact microphones and photo-voltaic sensors.

In 1984 Maubrey founded DIE AUDIO GRUPPE and began creating a series of such clothes - the Audio Uniforms - which are electronic suits conceived "on site".

The material of the suits, the sounds they produce, and the choreography of the actors are chosen with a specific context in mind and are meant to subvert the daily routine of their environment. A few examples:

- AUDIO HERD (Berlin 1985), two-piece suits of synthetic animal skin that play the recorded animal sounds while strolling through parks (see photo).
- AUDIO STEELWORKERS (Ars Electronica 1986), uniforms borrowed from the local steel plants and equipped with electronics that play the industrial sounds of their work palces.
- GUITAR MONKEYS, a trash music band wearing electronic vests that amplify electric guitars.
- AUDIO CYCLISTS (Festival Arts Electroniques, Rennes 1988), 10 members of a bicycle team are equipped with electro-acoustic sportswear and play a word-collage from a famous bicycle racer.

DOUGLAS KAHN

Amplifications: Transformations in Sound and Technology in the Western Avant-garde and Experimental Arts

Prior to the advent of the phonograph, cultural concepts of amplification were dominated by figures of the scream and loud or far reaching voices, subtended by a divine and anthropocentric aurality. Because the phonograph could record non-human sounds as well, the notion of all sound grew, as did the relational figure of a non-expressive dispersal, i.e., sounds deployed spatially throughout the environment and not situated by acts of human utterance. This phonographic birth of hearing was anticipated by a decade in Lautréamont's *Les Chants de Maldodor*, where the protagonist's scream upon confronting the violent monstrosity of the Creator created the sense of hearing. This one scene of the effects of amplification can be understood as the veritable Big Bang of modernist aurality. The loud sounds of modernity, especially the military sounds during World War I, imposed themselves upon the discourses of the avant-garde. Microphony and radiophony assured that sounds need not be imposing in themselves. Technologies for amplifying smalls sounds and transmitting others to great distances, created a new modulation of spaces, objects and bodies. They were also key in Varese's unrealized telecommunication works and at the crux of Cage's entire aesthetic. The denouement of modernist amplification arrived with the paradigmatics of La Monte Young, where the barely audible sustained at length becomes a way to assert aural acuity and loudness at the threshhold of pain a way to assert corporeal, social and environmental presence.

VIRGINIA MADSEN,
TONY MACGREGOR
Sound Design, Nature and the Post-Real

Because of the apparent transparency between the real and its recorded, replayed (and now digitalized) image, sound designers have been among the first to propose virtual space.

Through Hi-Fidelity technologies sound designers can fashion virtual sound environments that are faithful to the real. So much so that soundscapes, 'captured' from endangered natural environments, are being used in an effort to recreate 'natural' habitats in zoos, and so deceive animals into behaving as if they were in the Wild.

As the theorist Paul Virilio says, "The question of modernity and postmodernity is superseded by that of reality and post-reality."

This post-reality, here in the form of sound architecture, is able to puncture the real and interact with it.

(Sound is living; It creates response patterns, resonances, rhythms and counter rhythms).

These sound-grafts, as virtual worlds, have the potential to substitute themselves for reality, and return to us a world (in virtual, distilled form) that we are in the process of losing.

In this sense, Sound Design proposes a Sound Ecology.

Here, the Virtual becomes a bridge joining Nature to Culture; a graft composed of the distilled spirit that Nature offers up to heal all wounds. The sound designer can believe he is Nature's shaman, or Medium, for communicating with the dead Distilling spirit from the virgin earth, finding in the lure of the virtual a way back into alchemy.

There is a little known history here which deserves further distillation. The religious and utopian underpinnings of this postreality, created by

sound (which always has real effects) have gone largely unnoticed by the cultural critic. It is not that sound cannot afterall heal or that such interventions in culturally constructed environments like zoos may not lessen animal (and human) distress. It is rather that these interventions are taken at face value. Much is assumed uncritically. The transparency of the microphone for instance, the transparency of the digital, the category of Virgin Nature as distinct from corrupting Culture.

NICHOLAS GEBHARDT
Sounds Natural: Sonic Landscapes and the New Age

In calling for a new understanding of sound, the French composer Erik Satie suggested that "...we must bring about a music which is like furniture - a music, that is, which will be part of the noises of the environment, will take them into consideration." Creating such a music would be to open out to sound, to follow sound all the way to the point where it is no longer that; to the point where it becomes an army, or a chocolate cake, or a walk by the sea. One must know how to listen in ways other than in proper forms, if only to hear what is heard; if only to follow through the possibilities of a sounding out. One must listen to the heat, to the smell of death, to the return of good friends, for these sounds are long in the living of the ear.

With the rising popularity, and the obvious ubiquity, of ambient soundscapes, from deep trance to lush rainforests to rippling piano lines, Satie's call for a furniture music, for a music that functions in the same manner as light and heat, inevitably intersects with the seamless surface of these new sonic environments, raising the possibility of who might be listening, and how they are listening. In this

sense, the concept of ambience, as the trajectory of modern musical experience, releases hearing from the drive towards a pure sound, towards an absolute music, pointing instead towards the application of sound, towards the possibility of reconfiguring sound around what can be heard, around the act of hearing.

Ecology, ornithology, ethnography and marine-biology; a vast typology of elements is brought together in a frenzy of sampling that sends the listener spinning off into a sonic ether. The "sounds of the day" are made audible through their replication as compositions as part of an affective pulse that acts upon the way in which sound becomes apparent as sound, while enfolding the listener within a sonic space that creates an echo, a reverberation that alters the way of sounds in and around us.

NIGEL HELYER
Vectors and Virtual Space

An audio/visual presentation which outlines four recent projects by Nigel Helyer. "Big Bell Beta", "Semi-Automatic Writing", "An UnRequited Space" and "La Zonu del Silencio".

This paper discusses the conceptual and pragmatic developments of a 'pluri-discipline' which combines site-specific sculptural installation, performance and live radio broadcast in a synthesis of Hybrid Cultural Forms. This enquiry enters the paradoxical zone between our experience of Materiality and Virtuality with a critique which initially addresses the sonic domain from a Sculptor's perspective. Here the emphasis is on the experiential and phenomenological nature of sound and 'sound-events' are indexically linked to the material, dynamic systems which generate them, as well as to the architectures and environ-

ments which contain and propagate them. These concepts are subsequently developed as multi-site works which critique and manifest the enigma of describing tangible (phenomenal events) via the organs of transmission (an enigma which has become the central feature of the paradoxical logic that we 'accept' on a daily basis, eg. Radio/TV!!!). My interest as an artist is to explore this 'suspension of disbelief' with research which inverts and parallels this enigma by pursuing the definition and manifestation of various forms of cultural 'silence' (not the "Silence" of John Cage). Within the works discussed silence has both a physiological and metaphorical weight - the silence (silencing) created by political and economic processes lies in concert with the qualitative silence(s) of physical locations, or the incommensurability which exists between languages (cultural silences). In contra-distinction to the accepted role of the broadcast media - to turn the tangible into ethereal signs, my intention is to materialise those interstitial spaces which are overlooked or resistant to definition.

JOSEPH HYDE
Songlines

1. lost for words
2. found objects
3. seachange

SONGLINES is a 'non-narrative' narrative. Many texts were gathered, primarily folk myths from a diversity of cultures. These were laid in parallel to form a landscape through which a path might be laid. Points in common, archetypes such as emotional states, physical elements and structural signposts were used to build bridges between the sources to enable the path to travel as freely laterally as linearly.

This path was used as common to the various strands of the project. The path could be travelled with music, dance, video or animation. These various journeys having been made, the original landscape and path were discarded, leaving SONGLINES as a trace, a structure with the ceremony and form of a narrative, but none of the content.

sound: Joseph Hyde
vision: Tamara Cater, Lorne Christie, Rosie Gunn, Joseph Hyde

SAM INKINEN

SOUL OF A BINARY MACHINE
Introduction to Techno Music and
Rave Culture

Techno music is an aggressive, tech-
nology and future oriented genre of
youth culture and popular music. The
historical background of this musical
form lies in the avantgarde groups of
60's and 70's; especially Fluxus and
Kraftwerk. From a philosophical point
of view, techno can also be seen as a
continuation to the modernist avant-
garde movements such as futurism,
surrealism and dadaism of the early
20th century. Techno music is especial-
ly popular in Europe. What used to be
pure underground five years ago has
become evidently mainstream. The re-
cent commercial success of artists like
Sven Vaeth, Westbam, LFO, Orbital,
The Orb and Aphex Twin has proved
techno to be a fast growing youth
movement. Pop journalists and music
experts have claimed techno to be
"rock of the 90's". Concerning this, its
is not surprising that the massive party
concepts of Mayday and Love Parade
have been called "Woodstocks of the
90's". In my paper I will introduce and
analyse the latest developments of
techno music and aesthetics. During
the recent years techno has divided
into several sub-genres such as ambi-
ent, trance, hardcore and gabber. A
clear turning point can be seen. At its
current status quo, techno seems to be
a cultural phenomenon with a fasci-
nating mixture of experimental avant-
garde music and transnational pop
culture.

Techno music has been said to be
"a soundtrack of the information
age". Juergen Laarmann, the editor-
in-chief of German Frontpage techno
magazine, has also written that tech-
no music is only a small part of a
broader concept of techno culture. In
this case, we have to ask what is tech-
no culture? In Laarmann's opinion all

the computer based technologies
from computer networks to video
games and hypermedia programs rep-
resent techno culture. Concerning this
point of view, it is interesting to bring
up a citation from Bill Nichols' remark-
able article "The Work of Culture in
the Age of Cybernetic Systems":

The Computer is more than an ob-
ject; it is also an icon and a metaphor
that suggests new ways of thinking
about ourselves and our environment,
new ways of constructing images of
what it means to be human and to live
in a humanoid world. Cybernetic sys-
tems include an entire array of ma-
chines and apparatuses that exhibit
computational power. Such systems
contain a dynamic, even if limited,
quotient of intelligence. Telephone
networks, communication satellites,
radar systems, programmable laser
videodiscs, robots, biogenetically en-
gineered cells, rocket guidance sys-
tems, videotex networks - all exhibit a
capacity to process information and
execute actions. They are all "cyber-
netic" in that they are self-regulating
mechanisms or systems within prede-
fined limits and in relation to prede-
fines tasks. Just as the camera has
come to symbolise the entirety of the
photographic and cinematic process-
es, the computer has come to symbol-
ise the entire spectrum of networks,
systems and devices that exemplify cy-
bernetic of "a utomated but intelli-
gent" behaviour. [Screen 29 (1); Win-
ter/1988]

In my paper I will propose that
techno music should be seen and ana-
lyzed as a musical and aesthetic mani-
festation of cybernetic systems and
digital computer age. Therefore, tech-
no shouldn't be seen as only music but
as a broader philosophy and way of
life heavily linked to the develop-
ments of new media technology; espe-
cially computer networks (especially
Internet), video manipulation technol-
ogy and virtual reality. Techno music

has also created its own communicative and aesthetic code; such as cyberdelic art that was introduced in Chromapark and TechnoGraphica festivals in Berlin last spring. It could be called the musical Zeitgeist of 90's. Techno has replaced the concept of "concert" with a concept of "rave". Ecstatic, gigantic rave spectacles aim to create an immersive total experience. By hypnotic sounds, colourful laser lights and staccato-like stroboscopes an immersive, interactive "cyberspace" is created. This experience is often catalyzed by ravers with the empatogenic drug MDMA (better known by its nicknames "Ecstasy", "E" and "XTC"). Techno beat and non-stop dancing are the substantial particles of rave atmosphere. It is natural to relate techno music and rave culture to the history of shamanism. On a psychophysical level, rave experience also manifests the classical question of the relation between body and mind. In this context techno refers to the themes of a cyborgs (cybernetic organisms) and androgyne. These ideas are near what could be called a transhumanist thought; an idea similar to Stelarc's or Hans Moraveck's visions of the technological future of mankind. Techno music and rave culture should also be seen as a manifestation of classical techno-utopian thought. Man/machine cult and computer romanticism bring it near the visionary landscape of cyberpunk novels with the fictional concepts of cyberspace, 3D information networks, virtual identities and artificial intelligence.

Techno has been called "music in the age of deconstruction". The role of the DJ has changed from a passive "disc jockey" to an active "composer" and "programmer" of the intertextual material of techno sound. The key concept is sampling - a kind of a "cut and paste" method - that could be seen as a concrete example of postmodern cultural theory and postmodern thinking. Techno music and rave culture can also be seen as examples of "spectacle of ego" or a "schizophrene action of postmodern panic". Theories by Paul Virilio, Jean Baudrillard and Jean-Francois Lyotard have become important when analysing the philosophy and aesthetics of techno music and culture. Many of the key hypotheses presented by postmodern cultural theoreticians seem to fit well to the strategies of techno music. Concerning all this, techno music is a natural choice of music for a generation beeing born in the age of micro computers, video games and Terminator movies. It reflects to the needs, hopes and nauseas of the current youth. Therefore, techno is the music for "techno pagans" (Timothy Leary), "zippies" (= hitech hippies, Fraser Clark) and "Generation X" (Douglas Coupland).

SPACESCAPES**soundscapes**
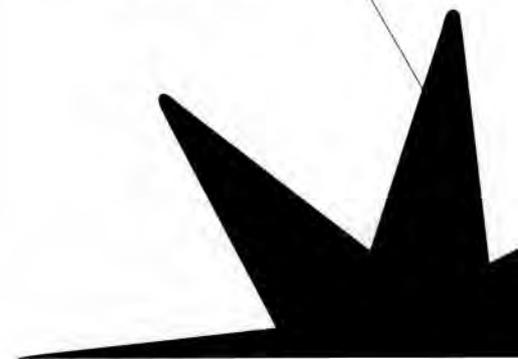
AMBIENT CITY
Soundscapes on 96,8 MHz

Ambient - surrounding, on all sides

Ambient music is a most fruitful crossing between 'high' and 'low' culture. Ambient-like sound structures have been brought out in contemporary music since the 1950. Ambient is music in space and as space, "intelligent background music". Static and meditative, it is music for the soul.

The AMBIENT CITY project is divided into three-week transmission periods, the second of which (August 20-September 12). coincides with ISEA'94. The radio station is situated in the Museum of Contemporary Art. The AMBIENT CITY sign, a 33000 watt 'lamp' glows on the outside: a lightgrid with a transmitter antenna in the middle, directed out to the ether. The visually effective lightpiece works as an AMBIENT CITY symbol as well as an outdoor advertisement.

The station functions through computerized IBM equipment; each three week period is preprogrammed into the software. The exhibition hall also has a computer monitor with text and picture information concerning the music. The room is filled with soundscapes from the radio and the glow of the lightsculpture. AMBIENT CITY combines music, environmental and visual art.

AMBIENT CITY is the first internationally significant radio experiment in Finland. The audience is Helsinki and its surroundings, though the project does not end at its reception areas. Ambient musicians are a group of talents keeping closely in touch with each other and communicating through the latest electronic media. Their ideas and projects spread immediately through networks all over the world.

Thanks to Tommi Grönlund of Sähkö (=electric) Recordings, AMBIENT CITY can present the most important Ambient music makers. The programme features large amount of commissioned pieces and special versions from all over the world (Atom Heart, Christian Vogel, Fred Gianelli, Muslim Gauze, Patrick Pulsinger, Pete Namlook, POL, Mixmaster Morris, Mouse on Mars), from Finland (RinneRadio, SIN Ö, Jimi Tenor) and Ambient 'classics' (Philip Glass, Steve Reich, Brian Eno, Klaus Schultze, John Cage, etc.)

RINNERADIO

RinneRadio offers fearless forays into an eclectic and broadly jazz-based musical world. Saxes, samplers and synthesizers are the foundation for the band's musical mix from hip-hop to Lapp joik chant. Despite the multiplexity, RinneRadio has never lost its musical thread. In fact, it has just steamed straight ahead and further developed its musical output: techno, ethno, jazz, rock and other elements are more tightly interwoven than ever before. The result is visionary music of international proportions that defies all attempts at classification. Up on stage, be it at a rock, jazz or ethno festival, the carefully devised visual presentation further demonstrates that this is a band unlike any other.

The band's CD single In Nera/ Amen / Kala includes three so-called ambient dance tracks which form a musical unity. These tracks were recorded during the sessions of the new album Unik, but did not fit into the final album concept.

Compared with the typical ambient dance music RinneRadio offers a rare combination of sophisticated programming, top quality musicianship and improvisation.

Tapani Rinne	sax
Kajasto	sounds&rhythm
Jari Kokkonen	sounds&bass
Janne Lehto	guitar
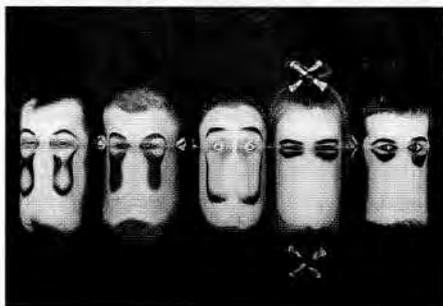
cave

MARGARET MORSE, JEFFREY SHAW,
ALEXANDRU ANTIK,
FRANCES DYSON

The Metaphor of Cave in the Electronic Arts

Fire rise! Freedom! Seated before the hearth the fireside audience is in rapt attention. In the furnace/puppet theater dance the burning flame of passion. The heavenly chords sing and separate from the director. Inflamed by the new found freedom sink amidst the lapping tongues. Offered the choice you will gladly resubmit to slavery. This is too intense. There are those who in captive chains sink under the weight, then there are those perverts who, fettered, raise their heads high in joy. Am I sorry for the perversions of my past? ...I'm sorry, please take me back! —Mike Kelly, *Plato's Cave, Rothko's Chapel, Lincoln's Profile*, (Venice, CA: New City Editions, 1986, p.44.)

The prehistoric cave was not only a shelter for human beings, it was a liminal sphere, a sacred place of transformation and for influencing the external world by means of images drawn on the wall. The cave or archetypal metaphor of being under or inside the earth evokes the enclosure of the womb and a sphere much like the underworld of antiquity, a realm not only of shades of the dead, but of unrealized possibilities, fantasies and dreams. For Plato, the cave was the counter- realm of reason. His Parable of the Cave is many things at once: a hierarchy of values—in Mike Kelly's rendition: "You are just an imperfect shadow of a single perfect idea be- fouled by matter, dirtied and made inconsistent by the clumsiness of matter—brutish matter."—a description of an apparatus of mystification, a metapsychology, and a prescription. The cave became the theoretical model for fiction in theater and later in film. What relevance does the cave metaphor have to various apparatuses in the electronic arts? What sorts of values and experiences are invoked in recent invocations of the cave as apparatus and metaphor? The object of this round-table is to use the cave not to arrive a unified conclusions, but as a way of following the unfolding of deep metaphor across cultures and apparatuses, and across different media and values related to concrete social and cultural experiences. Is the cave an appropriate metaphor for the transformation of information societies into electronic culture?

Margaret Morse will introduce the parable, the metaphor and the apparatus and discuss some of its ramifications for recent work in the electronic arts, including Beryl Korot and Steve Reich's *The Cave* as Biblical story and socio-political metaphor, as well as the CAVE apparatus for projecting images, to which Jeffrey Shaw's EVE apparatus was a response. After Jeffrey Shaw's description of EVE, Frances Dyson will introduce 'the cave of the imagination' metaphor in sound art and her critique of the model of interiorization implicit in it. Finally, Alexandru Antik, a Romanian artist living in Cluj Napoca will introduce several recent pieces, including "The Prison of Fantasy," a powerful evocation of dystopic enclosure installed at the "Ex Oriente

HIGH&LOW

contested zone

90%

ERKKI HUHTAMO

From Kaleidoscomaniac to Cybernerd. Towards an Archeology of the Media

In his classic *exposé* of the "archaelogy of the cinema" C.W. Ceram puts the prehistory of the motion pictures straight. He states promptly: "Knowledge of automatons, or of clockwork toys, played no part in the story of cinematography, nor is there any link between it and the production of animated 'scenes'. We can therefore omit plays, the baroque automatons, and the marionette theatre. Even the 'deviltries' of Porta, produced with the camera obscura, the phantasmagorias of Robertson, the 'dissolving views' of Child, are not to the point. All these discoveries did not lead to the first genuine moving picture sequence."[1] In another paragraph, Ceram elaborates on his position: "What matters in history is not whether certain chance discoveries take place, but whether they take effect."[2]

Curiously, the profuse illustrations of the English language edition (1965), collected by Olive Cook, openly contradict these statements. Plenty of "chance discoveries" have been included, supported by meticulously prepared captions. No doubt, for many readers this polyphonic array of curious traces of the past remains the truly exciting aspect of the book, not Ceram's pedantic attempts to trace the one by one steps which led to the emergence of cinema in the end of the 19th century.[3] The writer's primary focus is on the narrowly causal relationships which supposedly guided the development of the moving image technology. Tracing the fates of the personalities who made this happen comes next; other factors matter little. The reasoning is matter-of-fact and positivistic. Ceram never ventures upon speculations rising above the materiality of his sources.

The illustrations in Ceram's book, as well as the historical collections on display at such wonderful places as the Frankfurt Film Museum, can, however, be persuaded to tell very different stories, full of intriguing possibilities. As the French historian Marc Bloch taught, our conception of the past depends on the kind of questions we ask.[4] Any source, be it a detail of a picture or a part of a machine, can be useful, if we approach it from a relevant perspective. There is no such trace of the past, which does not have its story to tell. Another historian with a comparable attitude towards historical sources was, of course, Walter Benjamin, who (according to Susan Buck-Morss) "took seriously the debris of mass culture as the source of philosophical truth".[5] For Benjamin (particularly in his unfinished *Passagen-Werk*) the various remains of the 19th century culture – buildings, technologies, commodities, but also illustrations and literary texts – served as inscriptions, which could lead us to understand the ways in which a culture perceived itself and conceptualized the "deeper" ideological layers of its construction. As Tom Gunning puts it, "[i]f Benjamin's method is fully understood, technology can reveal the dream world of society as much as its pragmatic rationalization".[6]

Continuing the Benjaminian tradition, the German cultural historian Wolfgang Schievelbusch has shown us how such a broad concept of history can be used to shed light not only on the topic in question - the railway, artificial lighting, stimulants – but on the ways in which artefacts are embedded in the complex discursive fabrics and patterns reigning in a culture. From a predominantly chronological and positivistic ordering of things, centered on the artefact, the emphasis is swifting into treating history as a multi-layered construct, a dynamic system of relationships. Such a shift can also be detected in the field of media studies. The histories of media technologies, such as telephone, film, radio and television, have recently been researched by (re)placing them into their cultural and discursive contexts by

Tom Gunning, Siegfried Zielinski, Carolyn Marvin, Avital Ronell, Susan J. Douglas, Lynn Spiegel, Cecelia Tichi, William Boddy and others.[7]

This new media history clearly distances itself from the "objectivist fallacy" of the positivist tradition, admitting that history is basically just another discourse, a voice in the great chorus of voices in a society.[8] Historians have began to acknowledge that they cannot be free from the web of ideological discourses constantly surrounding and effecting them. In this sense history belongs to the present as much as it belongs to the past. It cannot claim an objective status; it can only become conscious of its ambiguous role as a mediator and a "meaning processor" operating between the present and the past (and, arguably, the future). Instead of purporting to belong to the realm of infallible truth (with religion and the Constitution) historical writing is emerging as a *conversational discipline*, as a way of negociating with the past.[9]

In line with this development, I would like make a few preliminary remarks about an approach I call "media archeology". While I share with the above mentioned historians an interest in synthetic multi-perspective cultural approach and historical discourse analysis, I see the aims of media archeology somewhat differently. I would like to propose it as a way of studying such recurring cyclical phenomena which (re)appear and disappear and reappear over and over again in media history and somehow seem to transcend specific historical contexts. In a way, the aim of media archeology is to explain the sense of *déjà vu* that Tom Gunning has registered when looking back from the present reactions into the ways in which people have experienced technology in earlier periods.[10]

Fantasmagorie, La Ciotat, and Captain EO

In the Frankfurt Film Museum, in a display case with different samples of 19th century Kaleidoscopes, there is an engraving titled *La Kaleidoscomanie où les Amateurs de bijoux Anglais* ("The Kaleidoscomania, or the Lovers of English jewels", presumably from the first part of the 19th century). We see several people (and, indeed, a monkey!) immersed in their Kaleidoscopes.[11] There are two "kaleidoscomaniacs" so mesmerized by the visions they see inside the "picture tube" that they don't even notice other men are courting their companions behind their backs. When stereography became a fad in the 1850's, we soon encounter exactly the same motive in stereographic photographs depicting humorously the less salutary effects of the new fashion.[12] The effect is the same, the only difference being that for the "stereoscomaniac" the immersion is "total": the eyepiece of the stereoscope covers the viewer's *both* eyes.[13]

Recalling C.W. Ceram's convictions, outlined above, we could wonder, if these occurrences are just *"chance discoveries"*, with no causal relationship and thus no historical interest? And is it just another chance discovery to note that the current revival of immersive peepshow-like experience in the form of the virtual reality craze has again brought forth the figure of the kaleidoscomaniac - this time in the disguise of the "cybernerd", whose passion for the other world makes him a fool in this one? The figure has already made its appearance in the cinema and in satirical cartoons, as well as on Music Television.

Another example: according to C.W. Ceram, there is no historical connection between Étienne Gaspard Robertson's *Fantasmagorie* shows, began in Paris at the very end of the 18th century, and Lumière brothers' *Cinématographe* presentations a century later. Even the use of the *laterna magica* principle for projecting the images on a screen doesn't warrant Ceram to posit a relationship.[14] However, if we compare contemporary illustrations about *Fantasmagorie* audiences' panicky

reactions to the ghosts attacking them from the screen, and reports about early cinema audiences fleeing in terror when the train in the Lumière film *L'Arrivée d'un train à La Ciotat* (1895) seemed to rush straight onto them, we probably cannot avoid a sense of *déjà vu* .[15] For someone who has visited Disneyland, for example, the association that comes to mind might be the Michael Jackson starred stereoscopic movie spectacle *Captain EO* , the "onslaughting" aspect of which has been enhanced – in addition to the customary 3-D effects - by laserbeams, which are released as if from the screen world to the audience space.[16] Even though the audience may not have reacted very vividly on the spot, the publicity, the media as well as the contemporary oral traditions re-telling the theme park experience make sure they did.[17]

Again, we may ask if there is any sense in looking for connecting links between these occurrences, wide apart in time and space. I would like to claim that these parallels are not totally random, produced indigenously by conglomerations of specific circumstances. Instead, all these cases "contain" certain commonplace elements or cultural motives, which have been encountered in earlier cultural processes. I would like to propose that such motives could usefully be treated as *topoi*, or 'topics', applying to the field of media studies the ideas that Ernst Robert Curtius used in his massive study *Europäische Literatur und lateinisches Mittelalter* (1948) to explain the internal life of literary traditions.[18]

The idea of *topoi* goes back to the rhetoric traditions of classical antiquity. According to Quintilianus (V,10,20), they were "storehouses of trains of thought" (*argumentorum sedes*), systematically organized formulas serving a practical purpose, namely, composing of orations. As the classical rhetoric gradually lost its original meaning and purpose, the formulas penetrated into literary genres. According to Curtius, "[t]hey become clichés, which can be used in any form of literature, they spread to all spheres of life with which literature deals and to which it gives form."[19] Topics can be considered as formulas, ranging from stylistic to allegorical, that make up the "building blocks" of cultural traditions; they are activated and de-activated in turn; new *topoi* are created along the way and old ones (at least seemingly) vanish. In a sense, topics provide "pre-fabricated" moulds for experience. Even though they may emerge as if "unconsciously", they are, however, always cultural, and thus ideological, constructs. This is my main objection to Curtius who sometimes resorted to the Jungian archetypes to explain the appearance of certain *topoi*. [20] In the era of commercial and industrial media culture it is increasingly important to note that *topoi* can be consciously activated, and ideologically and commercially exploited.

Discursive Inventions as an Object of Study

When we deal with *topoi* – such as the one related to the stereotypical panic reactions to a media spectacle – we deal with *representations* instead of actual experiences; we don't know (and perhaps never will), if any audience ever reacted to a *Fantasmagorie* or a *Cinématographe* presentation in the ways depicted in visual or literary discourses. Claiming that they did would be beside the point. The interesting thing is precisely the recurrence of the *topoi* within these discourses. It could be claimed that the reality of media history lies primarily in the discourses that guide and mould its development, rather than in the "things" and "artefacts" that for writers like Ceram form the core around which everything (r)evolves.

In this respect I share Michel Foucault's determination "[t]o substitute for the enigmatic treasure of 'things' anterior to discourse, the regular formation of objects that emerge only in discourse".[21] These "discursive objects" can with good

reason claim a central place in the study of the history of media culture. Even though Foucault referred to media systems only casually, a related strategy has been adopted by Friedrich Kittler is his *Discourse Networks 1800/1900*, in which he traces the gradual shift from one discursive system to another, drawing on a great variety inscriptions.[22] As David E. Wellbery has noted, "Kittler's discourse analysis follows the Foucauldian lead in that it seeks to delineate the apparatuses of power, storage, transmission, training, reproduction, and so forth to make up the conditions of factual discursive occurrences".[23] Instead of pursuing a systematic study of foucaultian "discursive formations", ideological traditions of discourses reigning in the society, and based on the interplay of power and knowledge, the approach I am delineating is actually closer to the field characterized by Foucault somewhat contemptuously as the history of ideas, "[...] the history of those age-old themes that are never crystallized in a rigorous and individual system, but which have formed the spontaneous philosophy of those who did not philosophize [...] The analysis of opinions rather than of knowledge, of errors rather than of truth, of types of mentality rather than of forms of thought."[24]

Registering false starts, seemingly ephemeral phenomena and anecdotes about media can sometimes be more revealing than tracing the fates of machines which were patented, industrially fabricated and widely distributed in the society, let alone the lives of their creators, if our focus is on the meanings that emerge through the social practices related to the use of technology. I agree with the cultural historian of technology, Carolyn Marvin when she writes that "[m]edia are not fixed objects: they have no natural edges. They are constructed complexes of habits, beliefs, and procedures embedded in elaborate cultural codes of communication. The history of media is never more or less than the history of their uses, which always lead us away from them to the social practices and conflicts they illuminate."[25]

From such a point view unrealized "dream machines", or *discursive inventions* (inventions that exist only as discourses), can be just as revealing as realized artefacts. A case in point, the *telectroscope* was a discursive invention which was widely believed to exist in the late 19th century. It was an electro-optical device which enabled an individual to "increase the range of vision by hundreds of miles, so that, for instance, a man in New York could see the features of his friend in Boston with as much ease as he could see the features of his friend in Boston with as much ease as he could see the performance on the stage".[26] Articles about the device were published in respected popular scientific journals such as *La Nature* and *The Electrical Review*; and even Edison was claimed to have invented it. Time and again it was announced that it will be presented to the general audience at the *next* world's fair. Yet the telectroscope never made an appearance except in these discourses, which were widely distributed in the industrialized Western world.

The telectroscope can be interpreted simply as a utopian projection of the hopes raised by electricity and particularly by the telephone, and realized decades later in the form of television. It should not, however, be discarded so easily. Television found its dominant form in broadcasting, which was very different from the role offered for the telectroscope as an individual and active "tele-vision machine", meant for individual person-to-person communication. Jaron Lanier's utopian vision of virtual reality "as the telephone, not as the television of the future" can thus be seen as another incarnation of a *topos* well known more than a hundred years earlier.[27] It remains to be seen, if Lanier's discursive version of VR will ever be realized, or if the rudimentary technology which inspired it will finally be

moulded into a form which is closer to the economically and ideologically constrained structures of broadcast television than to those of telecommunication.28

To sum up, it seems to me that the media archeological approach has two main goals: first, the study of the cyclically recurring elements and motives underlying and guiding the development of media culture. Second, the "excavation" of the ways in which these discursive traditions and formulations have been "imprinted" on specific media machines and systems in different historical contexts, contributing to their identity in terms of socially and ideologically specific webs of signification. This kind of approach emphasizes cyclical rather than chronological development, recurrence rather than unique innovation. In doing so it runs counter to the customary way of thinking about technoculture in terms of constant progress, proceeding from one technological breakthrough to another, and making earlier machines and applications obsolete along the way. The aim of the media archeological approach is not to negate the "reality" of the technological development, but rather to balance it by placing it within a wider and more multifaceted social and cultural frame of reference.

Notes

[1] C.W.Ceram: *Archaelogy of Cinema*, translated by Richard Winston, London: Thames & Hudson, 1965, p.17.

[2] Ibid., p.16.

[3] This purpose is served much better by Franz Paul Liesegang's equally classic chronology of the prehistory of the cinema, *Dates and Sources. A Contribution to the History of the Art of Projection and to Cinematography*, translated and edited by Hermann Hecht, London: The Magic Lantern Society of Great Britain, 1986 [originally published in German 1926]. Another, more recent attempt in historical chronology has been made by Maurice Bessy in his *Le mystère de la chambre noire. Histoire de la projection animée*, Paris: Editions Pygmalion, 1990. Bessy's year-by-year account incorporates plenty of hard to find documents illuminating the "discursive" side of the prehistory of the cinema - the attitudes, fears and hopes of contemporaries.

[4] Marc Bloch: *The Historian's Craft*, translated by Peter Putnam, Manchester: Manchester University Press, 1954 [originally published in French, 1949.]

[5] Susan Buck-Morss: *The Dialectics of Seeing. Walter Benjamin and the Arcades Project*, Cambridge, Massachusetts: The MIT Press, 1989, p. ix.

[6] Tom Gunning: "Heard over the phone: *The Lonely Villa* and the de Lorde tradition of the terrors of technology", *Screen*, Vol. 32, N:o 2 (Summer 1991), p. 185.

[7] See Tom Gunning: op.cit.; Siegfried Zielinski: *Audiovisionen. Kino und Fernsehen als Zwischenspiel in der Geschichte*, Reinbek bei Hamburg: Rowohlt, 1989; Avital Ronell: *The Telephone Book: Technology, Schizophrenia, Electric Speech*, Lincoln: University of Nebraska Press, 1989; Carolyn Marvin: *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century*, New York and Oxford: Oxford University Press, 1988; Susan J. Douglas: *Inventing American Broadcasting 1899-1922*, Baltimore and London: The Johns Hopkins University Press, 1987; Lynn Spiegel: *Make Room for TV. Television and the Family Ideal in Postwar America*, Chicago and London: The University of Chicago Press, 1992; Cecelia Tichi: *Electronic Hearth: Creating an American Television Culture*, New York and Oxford: Oxford University Press, 1991; William Boddy: "Electronic Vision: Genealogies and Gendered Technologies", A paper presented at the Finnish Society for Cinema Studies Conference, Helsinki, January 1993 (unpublished).

[8] For a brilliant analysis of historical writing as a discursive practice, see Hayden White's: *Metahistory. The Historical Imagination in Nineteenth Century Europe*, Baltimore: The Johns Hopkins University Press, 1973.

[9] Benjamin's influence could be detected also behind this emphasis. According to Susan Buck-Morss's interpretation, in *Passagen-Werk* he aimed at writing a "'materialist philosophy of history,' constructed with 'the utmost concreteness' out of the historical material itself [..], As the 'ur-phenomena' of modernity, they were to provide the material necessary for an interpretation of history's most recent configurations." (Susan Buck-Morss, op.cit., p.3.)

[10] Tom Gunning, op.cit., p185.

[11] The Kaleidoscope was invented by the British scientist Sir David Brewster in 1815 or 1816; his *Treatise on the Kaleidoscope* was published in 1819.

[12] For a general history of stereography, see William C. Darrah: *The World of Stereographs*, Gettysburg: W.C. Darrah, 1977.

[13] See the anonymous stereograph dating from the 1860's, reproduced on a View Master reel (Reel X, image 5) annexed to the book Wim van Keulen: *3D imagics. A Stereoscopic Guide to the 3D Past and its Magic Images 1838-1900*, AA Borger (The Netherlands): 3-D Book Productions, 1990. For another manifestation of the same motive, see the stereogram visible on the table in C.W.Ceram, op.cit., p. 112.

[14] The film projector is basically a modified *laterna magica*, in which the transparent glass slides have been replaced by roll film. Making the film move in front of the lens required a machinery which derived from clockwork mechanisms as well as from revolvers and machine guns.

[15] Two illustrations showing audience reactions, said to date from 1797 and 1798, have been published in Ceram, op.cit., p.38. The reaction to the Lumière film may be a purely discursive creation. There are scattered remarks - writing about his first *Cinématographe* show (in the *Nijegorodskilistok* journal, July 4, 1896) the Russian writer Maxim Gorki mentions that "it had been said that it [the train] will rush straight into the obscurity where we are", but gets disappointed. The train rushing towards the audience was featured in early Lumière posters or sketches (see Emmanuelle Toulet: *Cinématographe, invention du siècle*, Paris: Gallimard, 1988, p.11, 14.) The motive also appeared in early films about a fool who cannot tell the difference between reality and illusion in the cinema, such as *The Countryman and the Cinematograph* (R.W.Paul, 1901).

[16] Paying attention to similarities, we should not try to explain away differences: *Fantasmagorie* was connected with the tradition of magic shows, with the fascination of the show being in the unexplained quality of the tricks. In the case of the Lumière screenings, the *Cinèmatographe* as a technical novelty was an important aspect of the appeal of the show. Thus the projector was kept visible for the audience, whereas Robertson's magic lanterns were hidden from sight. Yet Charles Musser's observation that "Robertson's remarks [in his *Mémoires*] played on the simultaneous realization that the projected image was only an image and yet one that the spectator believed was real[.]" may apply to Lumière's (early) audiences as well. (Charles Musser: *The Emergence of Cinema. The American Screen to 1907*, part 1 of the *History of the American Cinema*, New York: Charles Scribner's Sons, 1990, p.24.

[17] A promotional video (1993) of the Showscan Corporation, a company producing and marketing speciality cinemas, opens with a simulation theatre sequence where wind, smoke, water, fire, a fish and even a UFO are "thrown" from the screen to the audience space. The audience reactions show pleasure rather than terror.

[18] Ernst Robert Curtius: *Latin Literature and the European Middle Ages*, translated by Willard R. Trask, London and Henley: Routledge and Kegan Paul, 1979 [originally published in German, 1948].

[19] Ibid., p. 70.

[20] "[An allegorical figure in Balzac's *Jésus-Christ en Flandre* (1831)] is only comprehensible by the fact that it is rooted in the deeper strata of the soul. It belongs to the stock of archaic proto-images in the collective unconscious." (Ibid., p.105.)

[21] Michel Foucault: *The Archaelogy of Knowledge*, translated by A.M. Sheridan Smith, London: Tavistock, 1982, p. 47.

[22] Friedrich Kittler: *Discourse Networks 1800/1900*, Translated by Michael Metteer, with Chris Cullens, Stanford: Stanford University press, 1990.

[23] Preface to Kittler: *Discourse Networks 1800/1900*, op.cit., p. xii.

[24] Ibid., p. 136-137.

[25] Carolyn Marvin: *When Old Technologies were New*, op.cit.,, p.8.

[26] *Electrical Review*, May 25, 1889, p.6, cit. Marvin, op.cit., p. 197.

[27] See John Perry Barlow: "Life in a Data-Cloud. Discussion with Jaron Lanier", *Mondo 2000*, n:o 2

[28] A model for this could be the *Sega Channel*, an interactive all-video game cable television channel, which is expected to start in the United States in 1995. Sega may adopt its already introduced head-mounted display for home use as an interface to be used for both individual and collective game playing through the Sega Channel .

LEV MANOVICH

The Labor of Perception: Electronic Art in Post-Industrial Society

Electronic artists rely on technologies developed by disciplines which did not exist just a few decades ago: computer graphics, image processing, computer vision, human-computer interface design, virtual reality and so on. The paper traces the history of these currently prominent image disciplines. My analysis begins in the 1920s when avant-garde artists, inspired by modern engineering, tried to systematically apply its principles to visual communication. To engineer vision meant to be able to affect the viewer with engineering precision, predictability, and effectiveness. Thus, Dziga Vertov championed montage as the most economical kind of communication while Sergei Eisenstein searched for units to measure communication's efficiency.

In its desire to engineer vision, the avant-garde was ahead of its time. The systematic engineering of vision took place only after World War II with the shift to post-industrial society. In post-industrial society, the mental labor of information processing is more important than manual labor. In contrast to a manual worker of the industrial age an operator in a human-machine system is primarily engaged in the observation of displays which present information in real time about the changing status of a system or an environment, real or virtual: a radar screen tracking a surrounding space; a computer screen updating the prices of stocks; a video screen of a computer game presenting an imaginary battlefield, etc. In short, vision becomes the major instrument of labor, the most productive organ of a worker in a human-machine system. The research into human- machine interfaces — from first computer graphics displays of the late 1940s to today's

VR — can be seen as attempts to make the use of vision in this new role as efficient as possible.

The importance of information processing for post-industrial society also leads to the necessity to automate as much of it as possible. The ultimate aim is the complete replacement of human cognitive functions by a computer, including the substitution of human vision by computer vision. This is the second trajectory of image research in post-industrial society; from pattern recognition systems of the 1950s to today's computer vision systems.

In summary, most of the new research into imaging and vision after World War II can be understood as following two directions: on the one hand, making human vision in its new role of human-machine interface as efficient and as productive as possible; on the other hand, transferring vision from a human to a computer.

Why should this historical analysis be of concern to electronic artists? The notion that the artist functions outside of society, history, and industry is a modernist myth. Modernist artists were not only the pioneers of the utilitarian aesthetics of modern industrial design and the techniques of modern advertisement and political propaganda, but they have also pioneered the post-modern engineering of vision, the integration of human and machine in human-machine systems, and the replacement of human vision by computer vision. Today, computer graphics industry is one of the sites of this engineering. Whether computer artists acknowledge or ignore their relationship to this industry, it exists. Acknowledging rather than ignoring this relationship is the first step toward a critical computer art practice.

ROSS HARLEY

Dig: An Archaeology of Technology and Entertainment in Spielberg's Jurassic Park

This paper argues that "Jurassic Park" can be considered as an exemplary moment in the convergence of a number of contemporary discourses on technology and entertainment. "We're all diggers" comments one character, musing on the significance of the mosquito trapped in the recently excavated amber he holds in his hands. We can take this comment as our cue for a different kind of excavation of the film's cultural ground.

The biggest movie of 1993, Spielberg's blockbuster epitomises everything about recent Hollywood's increasing dependence on spectacular event-based cinema. By mobilising a number of popular pre-existing fads and fears, the film manages to market itself on the back on a monumental popular fascination with the seemingly limitless bounds of technology. This paper takes the film's depiction of cloning, artificial life, theme parks, tourism, spectacle and entertainment as the starting point for a discussion on the status of the spectacle in contemporary culture.

PAUL DE MARINIS

The Edison Effect

"The opposition between hearing and staring finds its strange union with the diamond stylus, a diamond above all that writes out sound as well as reflects light."
(Duncan Smith, The Age of Oil)

A series of interactive sculptures that play ancient phonograph records with laser beams. The reflections of light from the walls of the groove carry the audio information to photoelectric devices where it is translated first into an electrical signal, then into sound by a loudspeaker. The resultant sounds range from recognizable to distorted, something like a distant shortwave radio or a haunting bit of a melody just barely remembered. The arrangment of optics, motors and light allow random access to the grooves of the records, permitting distortion, dis-arrangement and decomposition of the musical material.

Each Edison Effect player is a meditation on some aspect of the relations among music, memory and the passage of time. Our sense of time, memory, and belonging have all been changed by the exact repetition implicit in mechanical recording. The needle in the groove, no less than the needle in the vein, is one symbolic emblem on our quixotic quest for the perfect moment of fulfillment. Re-played here, without needles, the record becomes what it really is: a holographic object, a simultaneous *smorgasbord* to be consumed in the order and taste we see fit. The raw and raucous noises of the record surface commingle with the sounds inscribed in the groove, creating a havoc of misinterpreted intentions and benign accidents. The phonograph and the photograph have a coeval history of influence and development. The Edison Effect players demonstrate the photographic nature of acoustic recordings. These pinhole (or needlepoint ?) pictures of sounds long vanished project the shadows of sounds. Holograms, gamma rays, goldfish and cunieform serve to emphasize the parallel narrative of the mechanization of image and sonic inscription.

Al & Mary Do the Waltz (1989)
A turn-of-the-century Edison wax cylinder of Strauss' "Blue Danube Waltz" is turned on a paint roller rotated by a motor and rubber band. A laser beam is focused on the groove of the cylinder and its reflections are translated into sound. The laser beam passes through a bowl of goldfish who occasionally interrupt the beam to produce uncomposed musical pauses.

Ich auch Berlin(er) (1990)
A tribute to the Berlin(er) brothers, Emil, Irving, and John Fitzgerald. A gelatin dichromate hologram of a 78 rpm record of the "Beer Barrel Polka" is rotated on a transparent turntable and played by a green laser. Once I realized that only light reflections were needed to make the recorded grooves audible, it became apparent that a hologram (the memory of light reflecting from a surface) would suffice to play music. Here, sans needle, sans groove, the band plays on.

Fragments from Jericho (1991)
An authentic recreation of what is probably the world's most ancient audio recording. A clay cylinder inscribed (by intention or accident?) with voices from the past. By gently turning a large black knob, you can direct the laser beam across the surface of the turning clay vessel to eavesdrop on vibrations from another age.

Un-raveled Melody (1993)
Mechanical recording exerted its effects upon music composition by coercing preexisting rondo forms into ever tighter spirals. A hologram of Ravel's "Bolero" cycles forever, as the laser beam weaves its path along the dance floor.

Rhondo in Blew a la Cold Turkey (1993)
A 78 of "Rhapsody in Blue" is erratically scanned by a laser beam emitting from a hypodermic syringe. We may contemplate the addictive act of record listening as Oscar Levant plays himself playing Gershwin in another tired remake of "An American [Junkie] in Paris."

Paul De Marinis

HIGH&LOW**histories**
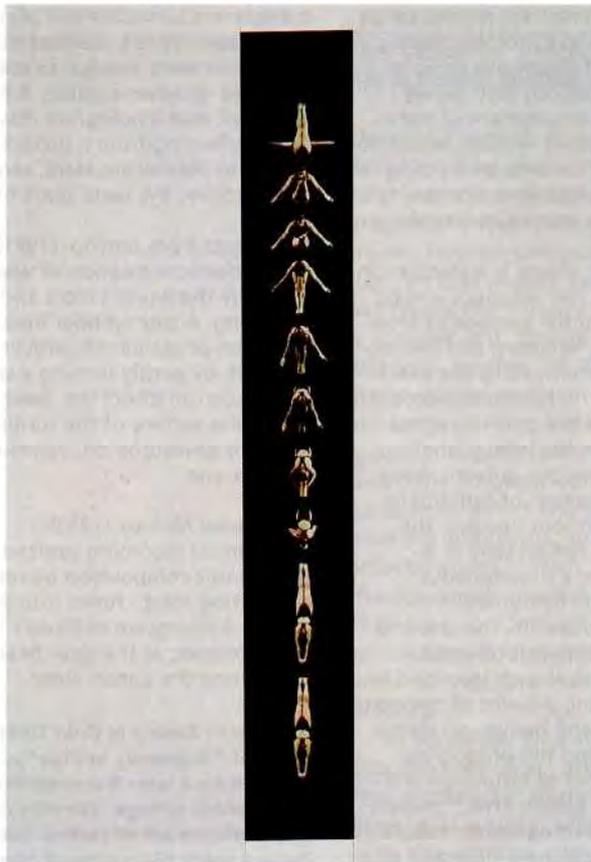
Rebecca Cummins

REBECCA CUMMINS
To Fall Standing

To Fall Standing features a video gun and stop-motion photographs in an interactive installation reminiscent of the shooting gallery at the carnival. A tiny video surveillance camera has been fitted into the barrel of an 1880's shotgun in conscious reference to the photographic machine gun designed by renowned French physiologist Etienne-Jules Marey in 1882 to capture the sequential movement of bird's wings in flight.

Considered to be one of the earliest cinematic devices, Marey's photo-gun (converted from a Colt revolving rifle) could be seen as the first in a lineage to the Gulf War ´slam-cam´ or missile born camera.

"The fact that the renowned scientist Marey cast his experimental apparatus into the form of a weapon of violence (machine guns were devised exclusively for warfare) cannot help but make us wonder: how, in a few decades, did the photographic apparatus evolve from the camera obscura – a roomy and passive receptacle for the faint traces of light – into a bizarre phallic weapon without a projectile?" (DeMarinis, P., Catalogue, To Fall Standing, Artspace, 1993.)

The relationship between guns and the cinematic is made explicit as the viewer is invited to point-and-shoot, simultaneously effecting the strobed, sight-line image which appears on a bank of monitors (video effect designed in collaboration with Steven Jones).

MICHAEL NAIMARK
Field Recording Studies

SEE BANFF! bears a strong – and intentional – resemblance to an Edison kinetoscope, which made its public debut one hundred years ago in April 1894. It achieved instant popularity, but was short-lived. One and a half years later, in December 1895, the Lumiere brothers publicly exhibited projected film for the first time, and cinema as we know it was born. The kinetoscope became a transitionary symbol during a turbulent era in the media arts.

Physically, SEE BANFF! is a self-contained unit about the size of a podium, made out of walnut and brass, with a viewing hood on top and a crank on the side, as well as a selector for chosing one of the silent "views."

These views were filmed around Banff and rural Alberta in autumn 1993. They were recorded with two stop-frame 16mm film cameras mounted on a "super jogger" baby carriage. Stereoscopic recording was either triggered by an intervalometer (for timelapse) or by an encoder on one of the carriage wheels (for dollys and moviemaps). Since the filming was "stop-frame" (rather than "real-time"), time and space appear compressed.

The imagery is part of an investigation of the role of media and its relationship to landscape, tourism, and growth. Recordings were made dollying along waterfalls, glaciers, mountains, and farmland; moviemapping up and down popular natural trails; and timelapsing tourists.

SEE BANFF! looks and feel like a real kinetoscope. Turning the crank allows the user to browse back and forth, to "move through," the material.

SEE BANFF! is an interactive stereoscopic kinetoscope installation. It is based on footage recorded during the third and final phase of Michael Naimark's "Field Recording Studies," a project in the Art and Virtual Environments program of the Banff Centre for the Arts, produced in collaboration with Interval Research in Palo Alto.

Michael Naimark

GEERT LOVINK

Sovereign Media and the Data Dandy.
Two Fragments of Adilkno's Media Theory

The two fragments below are part of the media theory of ADILKNO (the Amsterdam-based Foundation for the Advancement of Illegal Knowledge, founded in 1983). The concept of sovereign media and the figure of the data dandy are examples of UTOs (Unidentified Theoretical Objects). UTOs are potential media; their existence is unlikely, their forms vague. Many UTOs were first sighted in Mediamatic magazine and then brought together in the Media Archive book (originally published in Dutch in 1992 and updated in a German edition in 1993). Potential media are a recent phenomenon in the history of the Amsterdam alternative media movement. Potential media (figures) incorporate and move beyond alternative media strategies. In Amsterdam there exists the freedom to experiment with media, not just with respect to concrete political and economic issues but in other ways as well. The Californians imagine the fusion of high and low tech for the rest of the world in corporate dreams of virtual reality and data highways; but the future can be imagined in other ways. ADILKNO's writings mix and cross-pollute cultural commodities and technologies. The paper will illustrate this practice through the example of the multirational Amsterdam pirate Radio Patapoe. Patapoe is anti-information and anti-fashion, preferring instead to reprocess society's cultural waste. Patapoe laughs in a Nietzschean way at fascination for the new; it is an example of a sovereign medium which has emancipated itself from any potential audience or target demographic. The paper will also discuss the data dandy as an example of the phenomenon of the potential media figure. The data dandy searches for an aesthetic way to deal with information overload. (The Data Dandy is also the title of ADILKNO's most recent German lecture tour and book.) Like the cyberpunk, the data dandy is a product of literary fiction and should not be viewed as a role model.

Sovereign Media
Sovereign media insulate themselves against the hyperculture. They seek no connection; they disconnect. This is their point of departure. They leave the media surface and orbit the multimedia network as satellites. These do-it-yourselfers shut themselves up inside a self-build monad, an "indivisible unit" of introverted technologies which, like a room without doors or windows, wishes to deny the existence of the world. This act is a denial of the maxim 'I am connected, therefore I am.' It conceals no longing for a return to nature. They do not criticize the baroque data environments or experience them as threats, but consider them material, to use as they please. They operate beyond clean and dirty, in the garbage system ruled by chaos pur sang. Their carefree rummaging in the universal media archive is not a manegement strategy for jogging jammed creativity. These negative media refuse to be positively defined and are good for nothing. They demand no attention and constitute no enrichment of the existing media landscape. Once detached from every meaningful context, they switch over in fits and starts from the one audio-video collection to the next. The autonomously multiplying connections generate a sensory space, which is relaxing as well as nerve-racking. This tangle can never be exploited as a trend-sensitive genre again. All the data in the world alternately make up one lovely big amusementpark and a five-star in the paranoia category, where humor de-

scends on awkward moments like an angel of salvation and lifts the radioprogram up out of the muck.

Unlike the 'anti media movement', which is based on a radical critique of the capitalist (art) production, the sovereign media have alienated themselves from the entire business of politics and the art scene. An advanced mutual disinterest hampers any interaction. They move in parallel worlds which do not interfere with each other. No anti- information or criticism, politics or art is given in order to start up a dialogue with the authorities. Once sovereign, media are no longer attacked, but tolerated and, of course, ignored. But this lack of interest is not a result of disdain for the hobbyist amateur or poltical infantilism; it is the contemporary attitude towards any image or sound that is bestowed on the world anyway.

Sovereign media are equipped with their own starters and do not need to push off from any possible predecessors or other media. They are different from the post-'68 concept of alternative media and from the autonomous 'inside'-media of the 80s. The alternative media still work with the priciple of 'anti-publicity' and mirror the mainstream media, which they feel needs to be corrected and supplemented. This strategy aims to make the individual aware of his behavior as well as his opinion. This process will ultimately be seen in a changed public opinion. These correcting media have no general claims but work with a positive variant of the cancer model, which assumes that in the long term everyone, whether indirectly or through the infected big media, will become informed about the problem being broached. They presuppose a tight network streched around and through society, so that in the end the activism of a few will unleash a chain reaction by many. Until that time, they direct themselves at a relatively small group, in the centainty that their info will not stay stuck in a ghetto or start feeding back in the form of internal debates. This 'megaphone model' aims in particular ate liberal-left opinion leaders, who have no time to accumulate information or invent arguments and get politically motivated specialists to do this thankless work. Movements in the 60s and 70s gave themes like feminism, the third world and the environment a great range this way. Professionalization and market conformism in those circles, however, have caused people to switch to the 'real' media. The laboratories where information and argumentation get tested are currently an insaparable part of the process to 'manufacture consent', now that their movements have become just as virtual as the media they figure in.

At the end of the 70s, radicals who had gotten tired of waiting for the other's change of consciousness founded so-called 'inside media'. At precisely the moment that the official media started emancipating themselves and terms like 'press' and 'public opinion' vanished from the scene (together with the rise of satellite-broadcasting and cablesystems), a group of activists gave up the belief in their deaf fellow citizens and got to work themselves. Although to unknowing outsiders they seemed a continuation of the alternative media activity, they let go of the cancer model and, like the official media, wnet gliding. The mirror of the alternative media was crushed. It had become pointless to keep appealing to public responsability; they needed to look for a different imaginary quantity to concentrate on: 'the movement'.

Although they were only locally available, they had no concern for the regional restriction which the ascending local media impose upon themselves. They no longer wanted to be alternative city papers. In form as well as content they became transnational, like their global peers. They wanted nothing to do

HIGH&LOWhistories

with growth. Their brillant dilettancy turned out to be a childhood illness, but an essential component. As a leftover product of vanished radical movements, which flare up every now and then, their continuity and unchangingness in design and content remain breathtaking to this day. It cannot be reduced to their dogma. They turn away from the short media time and create their own space-time continuum.

The sovereign media are the cream of all the missionary work performed in the media galaxy. They have cut all surviving imaginary ties with truth, reality and representation. They no longer concentrate on the wishes of a specific target group, as the 'inside' media still do. They have emancipated themselves from any potential audience, and thus they do not approach their audience as a moldable market segment, but offer it the 'royal space' it deserves. Their goal and legitimacy lie not outside the media, but in practicable 'total decontrol'. Their apparently narcissistic behavior bears witness to their being sure of themselves, which is not broadcast. The signal is there; you only have to pick it up. Sovereign media invite us to hop right onto the media bus. they have a secret pact with the noise, the father of all information. And time is no problem - there is room for the extended version as well as the sampled quotation. This is only possible through the grace of no-profile. Without being otherwise secretive about their own existence, the sovereigns remain unnoticed, since they stay in the blind spot that the bright media radiation creates in the eye. And that's the reason they need not be noticed as an avant-garde trend and expected to provide art or social movements with a new impetus. The reason sovereign media are difficult to distinguish as a seperate category is because the shape in which they appear can never shine in its full lustre. The program producers don't show themselves; we see only their masks, in the formats familiar to us. Every successful experiment that can possibly be pointed to as an artistic or political statement is immediately exposed to contamination. The mixers inherently do not provoke, but infect change passerby with corrupted banalities which present themselves in all their friendly triviality. An inextricable tangle of meaning and irony makes it impossible for the experienced media reader to make sense of this. The atmosphere inside the sealed cabin conflicts with the ideology of networking. As a central coordination machine, the computer subjects all old media to the digital regime. The sovereign media, conversely, make their own kind of connections, which are untranslatable into one universal code. High-tech is put to the test and turned inside out. But this trip into the interior of the machine does not result in a total multimedia art work. Disbelief in the total engagement of the senses and technically perfect representation is too great for that. The required energy is simply generated by short- circuits, confusion of tongues, atmospheric disturbances and clashing cultures. Only when computer-driven networks begin to break their own connections, and scare off their potential users, will it be time for the sovereigns to log in.

The Data dandy
The data dandy only collects information to flaunt it, not to transfer it. He is informed all too well, even excessively so. Specific questions prompt undesired answers. The phenotype of the data dandy is confronted with the same fear as his historic predecessor, whose stages were the street and the salon. The elegant extravagance with which the most detailed information is displayed, shocks the efficient media user. He mocks measured consumption and intake of current news and amusement in dosages and doesn't worry about excess or

overload of specialistic knowledge. His carefully composed information portfolio shows no constructive motivation. His zapping is not prompted by boredom, but by a superior unwillingness to stay in touch with current events and the latest trivia.

The screen is the mirror in front of which he does his toilet. The button/unbutton of the textile dandyism has found its successor in the channel surfing of the on/off decadentia. He spends the majority of his computer time on the dashing structure of his hard disk and the creation of refined connections between thousands of heterogeneous software bibelots. The powerbook as an ornament is the pride of many a salon digitalist. He jeers at actuality, hype and fashion: for a moment, an I emerges, who is his own anchorman. In the era of multi-media mass information there is no discernable difference between uniformity and multiformity. Neither a grand overview nor the explanatory detail can control the confusion of mind. In that light, the data dandy proves what everybody already knows: that information is omnipresent, but not freely available. Certain facts are very decorative and you have to develop a good nose for that. In contrast to the data collector, the ditto dandy is not concerned with the obsession of the complete file, but the accumulation of as many immaterial ornaments as possible. While the otaku is introvert and never crosses the boundaries of his lone cultivations (Grassmuck), the data dandy searches out the most extrovert news groups to launch his unproductive contributions. Whatever the data dandy snatches to present elsewhere is latently of interest, if it were not that his presentation is so indiscreet.

His whimsical wit distracts from everyday items. The genius of his bon mots lasts 30 seconds, after which they disappear from the screen as quickly. Our dandy is a broker in gigo-ware. Your garbage is his make-up and his substance your fluidum.

What the street used to be to historical dandies like Brummell, Baudelaire and Wilde, the Net is to the electronical one. Cruising along the data boulevards can not be prohibited and clogs the entire bandwidth in the end. The all too civilised conversation during the rendezvous stirs up some misplaced and inconvenient information, but never leads to dissidence. Wilfully wrong navigation and elegant joyriding in somebody elses electro-environment is targeted to trigger admiration, jealousy and confusion, and self-assuredly heads toward a stylized incomprehension. One fathoms the beauty of ones virtual appearance to the moral indignation and the amusement of the plugged-in civilians. It is a natural quality of the carpet-knight to enjoy the shock of the artificial. That is why he feels so much at home in the cyberspace and all its attributes. Only the scented water and the red stockings have been replaced with the prestigious 'Intel', delicate datagloves, and butterfly goggles laid in with rubies, and there ar e sensors in his eyebrows and nostrils. Down with the boorish NASA aesthetics of the cybernauts! We have long since passed the stage of pioneering. What matters now is the grace of the media gesture.

oppositions

RICHARD WRIGHT

It Looks Just Like Art; Computers, Class and Cultural Positioning

More important than what you can make with electronic media is what you can do with what you make. Electronic media is not just a random collection of tools for making pictures but a system of interlocking artistic, technological and commercial interests that are coming together into new cultural and social formations. It has now become impossible for cultural institutions to ignore the pressure being applied by previously marginalised groups and formations as they exert their new found economic influence made partly possible by the commercial traffic in technological media. In turn, the potential appears for spaces to be created where a wide range of cultural interests can develop, gain confidence and begin to operate.

It is becoming increasingly difficult to position new media practices within the cultural spaces of galleries, publications, conferences or popular entertainments with so many different interests at work. As new producers emerge their greatest challenge is the formation of new audiences and support structures. How the forces of cultural hegemony react to these new players will be crucial in defining what is possible and where far more than their technical facilitation. As aesthetic standards are disrupted there are many instances where new forms of legitimation are emerging, leading to the prospect of certain technologies and practices being declared 'artistic' at the expense of others.

GRAHAM HARWOOD,
MATTHEW FULLER (CHAIR),
SADIE PLANT, GRAHAM HARWOOD,
STEVE BINNION, MIKE STEVENTON,
GOMMA X

Saddling The Troyan Horse

We live, swirling in images not of our own making, "echoes that arrest experience and play it back in slow motion. Cameras and recording machines not only trranscribe experience but alter its quality, giving to much of modern life the character of an enormous echo chamber a hall of mirrors. Life presents itself as succession of images or electronic signals, of impressions recorded and reproduced by means of photography, motion pictures, television, and sophisticated recording devices. Modern life is so throughly mediated by electronic images that we cannot help responding to others as if their action and our own-were being recorded and simultaneously transmitted to an unseen audience or stored up for close scrutiny at some time later."

The image has become central to the radical debate within culture and anything that challenges the production of imagery will lead inevitably to fundamental shifts in working practises and the theoretical positioning of disaffected cultural groupings. The current development of photo retouching technologies and the computer's ability to create a level "aesthetic-playing-field" is framing the debate for the 90s. A new and urgent emphasis is now to be placed on the nature of "image as information" with its transition of the image from stable fixed entity existing in the physical world, to the plastic malleability of an image reduced to raw data waiting to be processed rather than authored.

GEORGE LEGRADY
An Anecdoted Archive From The Cold War

An Anecdoted Archive from the Cold War is an interactive computer media artwork installation project that features early 1950's East European personal and official Communist material in the form of home movies, video footage of Eastern European places and events, objects, books, family documents, Socialist propaganda, money, sound recordings, news reports, identity cards, etc. These are part of my collection of things and stories related to the Cold War that I have gathered during the past 20 years. These items, in the form of over eighty stories, have been arranged thematically in eight rooms superimposed on the original floor plan of the former Workers' Movement (Propaganda) museum in Budapest - (the original contents of which have been in permanent storage since 1990). The Anecdoted Archive reflects my particular history in relation to the Cold War. Born in Budapest in 1950 near the end of the Stalin era, I fled with my family to the West during the 1956 Hungarian Revolution.

PETER BROADWELL, ROB MYERS, REBECCA FUSON
Plasm: A Country Walk

This interactive art installation piece consists of a large screen with a dog leash out in front of it. When you first come upon it the screen is showing a sleeping dog (or a bouncy yelping one depending on how long since the last "walk".) Picking up the leash wakes the dog up and off you go.

At first you are walking down a photorealistic country lane, bouncy puppy dog in front of you and all. Sound effects give a sense of presence to the world, chirping birds, crickets, footsteps as you cross bridges etc. The leash is both your input device and the computer's feedback device, it pulls you when the dog sees something off the road that it wants to investigate. Depending on how compliant you are to the dogs wishes you will encourage more or less "mutations" of the environment. Over time image proccessing effects and fractally generated scenery will eat away at the photorealism and leave you walking through a stranger and stranger world.

There is no end to how long you can walk as more scenery is constantly generated. Of course the dog gets tired after a while...

Of particular interest is the novel force feedback that the leash provides as well as the realism of the imagery, at least until you have walked a long way and "evolved" a very strange world.

The piece consists of a 3DO Interactive Multiplayer, a custom force reflective electronic dog leash, custom software and large screen rear projection television.

George Legrady

Personal Documents

1956

2 Ft

Archive Narrative   FLOOR PLAN

Hungarian Home Movies: 1950's

Visegrad House Saga

Bullet Holes in Our House

Kissing Scene: Then & Now

Escape Story Narratives

New Immigrants in Canada

east/west

MARINA BASKAKOVA
In Search for the Third Reality

"The Third Reality" is a Russian centre for computer-oriented art recently founded in St. Petersburg. The Centre was created with the administrative and financial support of CREAT Inc., a major Russian Company specializing in the field of high technologies.

Computer-based technologies took some time to reach Russia, the space and military industries being the first to adopt them. Within the last 3-4 years, however, computers started to penetrate into the mass media. Computer-designed opening titles and special effects appeared on the Russian TV screens. A number of private companies and corporations is currently specializing on computer animation for TV and computer-generated promotion spots for large corporations. CREAT Inc. has been and still remains one of the leaders in the area of multimedia and computer animation.

Unfortunately, the application of computer technologies is today generally limited to the commercial and advertising activities. These new technologies are not easily accessible to the artists - cinema workers, painters, musicians.

While the theorists strive to comprehend the consequences of electronic technologies penetrating into the Western culture, the Russian artists suffer from the unavailability of this sophisticated equipment and sometimes, from the lack of information on the advanced technologies in question.

The purpose of the First International Forum of Computer-oriented Art "In Search of the Third Reality" held in St.Petersburg in September 1993 was precisely to bridge this gap. The Center for Computer Oriented Art born as a result of the Forum has the same main purpose: to pulicize and promote new technologies into the sphere of Art and Culture.

The objectives of the Center are to accumulate information related to computer-based art and audiovisual culture, to foster the R&D and artistic studies on computer-based arts and to study the pecularities of the assimilation process of the new technologies into the Russian culture.

When commercial firms operating in the sphere of electronic technologies, such as CREAT Inc. realize that it is not enough to possess these technologies, it is necessary to learn to CREATE with their help, we may hope for new outstanding results from this union.

MIHAIL KUZNEZOV
The Prosthesis of the Event in Cyberspace: *La reserche du temps perdu* beyond Oedipe and Gnosis

The story developed in Ulysses, the narrative of a lonely, cunning hero and his magnificent victories over the mythological powers, was not by any means a commentary on 'the reality' of the already realized event, of the discreditation of mythological time-lessness, and on the establishment of the three-faceted structure of time, as Horkheimer and Adorno imagined in 'Dialectics of Enlightenment'. On the contrary, it was the act during which the possibility of a narration of it, distanced from ancient myth was constituted for the first time. In the real world, structured like a text, an interactive interface with the past is impossible.

'The Book of Life' is meant to be read only once. Of the fragments of the Book, only those events that irrevocably sink into Lethe, can be subordinated to 're-reading'. These fragments can be equalled to ROM files: they can be given rebirth in memory, and for any number of times, but you cannot change anything in them. As opposed to the real world, in the virtual reality of cyberspace, no prohibitions are known to the reactualisation of any event. Potentially, i.e. not depending on the hardware, the software can be multiplied infinitely, and in every act of copying the software remains the same because of its digital nature: since Plato's time we know that in the case of ideas or numbers we are dealing with essences that cannot be effected by spatial or temporal changes. The digital nature of the beings and essences of cyberspace is based firstly to their protistic nature – all the members of a digital number group 0-9 are characterised by complete mutual transformability into each other – and secondly,to their prosthetic nature – the finger of a hand is explicitly an organ that centers in itself all the original capability of touching, dispersed in the somatics, which will then be modified into five senses and into all the prosthetics of human corporeality available today, that meditatively expand the scope of bodily touch to every existing thing.

As a consequense of this, the proshtesis of an event in the virtual reality of cyberspace can be described as follows. Even a distinct digital simulation of an event does not know any spatio-temporal restrictions: it is simultaneously both in space and in time, a simulation of every possible and impossible event in the real world, completely corresponding to the ancient formula 'One is all, all is one.'

ALLA MITROFANOVA
Art and Technology as the New Avant-garde

Machine Vertebral Animal
The status and understanding of technology in the computer epoch is very different from 'optic-engine based technology'. As opposed to the human body, an engine is a different body/construction. The human body was understood as a unit, as an undebatable organism. Computer technology can't be separated in reflective categories from the subject and, in a way, from the body. A machine now is not a structure that is alienated from the subject. (Structures don't go on the streets! – slogan of 1968). Technology is intermingled with intimate human life as a part of the 'molecular structure'. Technology seems to be saturated with desire, seduction, 'automata of the body'. It is supposed to be combined with desire with functions of the body and the filters of perception.

Assemblage of Representations, Body
When making a comparison between the body and the subject we work on the side of the subject. Making analyzable the bodily practices and the unconscious, we are continuing to dissociate the body, from one side and to incorporate it into forms of representations from the other side. The only territory of the body is the terrain of transgression, affect, death, sex. The body is incorporated into language and viewed through a multitude of practices. The practices could be understood as an assemblage of verbal and visual possibilities taken from past and present (marginal and dominant) culture.

The Art of the Disembodied Subject
a) dislocation. A virtual portrait (in VR games, for example) could include the following: mind, age , character, temperament, style, design, sex. Everything that was articulated, analyzed inside the subject could be terminated and artificially used. A subject is a landscape, open for a multitude of subjects, that can be recombined or segmented for different needs and functions. A subject can't live beyond the cultural media: literature, film, TV. It needs to be disembodied, moved to interfere with other life forms and to be dislocated from the automatic 'natural' body. It has a multitude of images and a freedom of recombining and choosing itself.

b) Segmentation and interactivity. Interactivity is different from communication and information. An interactive technology needs a special subject and atactics, that avoids stable codes and emphasizes the process of collaborative acting.

The paper will be illustrated with conceptual and video installations by Russian artists and by experts from experimental TV in Russia and the Piazza Virtuale in Kassel.

VIKTOR MAZIN, OLESSIA TOURKINA
Golem of Consciousness

Controller and controlled are the transitional notions, their interchange ability can be discovered in diachronic as well as in the synchronic systems. However, if before it was possible to juxtapose the positions of controller and controlled, in the mass-mediatized society the face-to-face opposition is vanishing in the network of cables and wires. As two different examples of the interactivity between controller and controlled, TV and computers might be considered.

Who gives birth to a controller? The answer (the question) is the one to the question (answer) of who is a controlled? Power gives birth to the seperation of controller and controlled. And power is coming into the light through the possession of knowledge. Knowledge is always appearing

at the expense of time (and on account of time).

The result of the expense-of-time operation is epistemological profit. Which might be considered as morphogenetic field of epistemology, as capture-mechanisms working at the-expense of the time lag (Nachtrglichkeit) betweenfuture and present. The high speed of the process creates a situation of: from one side (Ego side), the illusion of overcoming of psychic trauma of the meeting with a fake reality (and any meeting with any kind of reality is trauma); and, from the other side (Inter-Ego, or Super-Ego side), the interweaving of human extensions into the common nervous network (M.McLuhan), or noosphere (V. Vernadsky). This process might be considered at the same time as technological Aufhebung, as well as Selbst-Aufhebung. This situation on the level of controller-controlled leads to an inside scandal between Ego and Super-Ego, to the hypertrophy of conscience, and then to the posibility of dissociation of a human being, to the mechanisms of the syndrome of psychic automatism.

The example of an exploitation of the "high-jacking"of time and the syndrome of psychic automatism is virtual reality, a next religious Golem of consciousness, constructing "future gadget" at the account of taking a being from the present to the "reality" programmed and controlled by the past.

ALEXANDER SEKATSKY
The Tools of Desire and New Technologies

1. The Will-Desire space is not immanent; the compact groups of desires are not exchangeable as "hard currency". The clump of desires is alike the cluster of flower. The flowers may have different degrees of suitability to each other, they may or may not suit to one common cluster.

2. The kinds of pleasures differ (first of all) in their topology, They have their own "soul slices" for resounding. I propose to divide the whole desire map into three spheres: 1) one's own body; 2) The body and the soul of the Other; 3) The mirage (imaginary) territory without "natural" resonators of the desires.

3. The topological classification differs from the late Freudian division on Eros and Tanathos drives (which is founded on localization of the source of energy), it differs also from the well-known dichotomy of libido and I-drives. The Eros drives reverberates only in ones own body (first topos), but they can migrate to the second sphere, for example when one's body enters into the state of decay and loose the possibility to be a good resonator (phenomenon of favoritism)

4. The third topos units all desires, which are realizing out body limits and are not connected with reverberating in the body of the Other. The special "long-drives" are projecting here, they were always the subject of interest of the "strong philosophers". We may remember a will to immortality of Nicolay Fedoroff, the death drive of Freud, "la caress-de-soi-meme" of Foucault, a will to Power (Nietzche). These long drives, being re-flected, achieved the other two spheres also (here is the source of difficu ties in philosophy and psychology). But here are some constructions in the imaginary topos, which are not connected with our long-drives.

5. Basically, the new technology of desire intends to expand to the territory of non-human for the aim of domestication the radical otherness of the world. Technology is looking for those slices of reverberation which are more solid and multi-dimensional than body. Computer games imitate the long-drives (an all-mighty politi-cian, Demiurg etc.), while virtual reality tries to destroy the body-orientation of the I. WE may say that technology (in the degree of it's domestication) realizes the basic existential call, the most clearly formulated by Russian philosopher Nicolay Fedorov: the call for the synthesis of new body. In this case, technology has one super-task: to achieve the general convertibility of desires and pleasures.

MARAT GUELMAN
Conversion

The program of conversion was initiated at the dawn of Perstroika. It stemmed from the belief that it was possible to modernize the Soviet Union without taking any radical economic steps. The passion for ideological stereotypes which were a far cry from reality became fully evident when the idea of conversion popped up. The populist ideas of how economic problems could be expected to be easily solved through conversion, using conversion as an argument in international politics, the break-up between its advocates and opponents from the public and, finally, the collapse of the program are all symptoms signalling a new Great Utopia.

While legislation, competition for power, privatization and interest rates all have references in the society as represented by indivituals interested in respective phenomena, one can get an impression that there is no one interested in conversion. The problem has been left without public support, it has not been made use of by any political force. Conversion has resolute oppoenents but no ardent champions. The lack of public pressure makes it a marginal problem in public policy.

The marginalized position of conversion is what we are attracted by. Art claims a special role in the society and shows no momentary effects and market values, nor does it pursue didactic and propagandist aims. The paradoxical thinking of the present-day artist is capable of bringing forth a number of new interpretations of the problem giving it a priority, introducing it into the context of an ideological dispute and delienating certain historical parallels.

The aspect of form is another important thing. The military style, design, colours, and paraphernalia, as well as metal, tarpaulin, nets and oils are all alluring art materials. The tradition of hoisting guns onto pedestals does not only stem from imperialist ambitions but is the result of the monumental beauty inherent in military weapons. Guns and sabers hung on walls to decorate apartments were rivals of paintings. Military uniforms and matryoshka dolls are heaped on trays of vendors selling kitch in the streets. One could easily imagine major weapons manufacturers working solely as producers of souvenirs, tanks being assembled specially for monuments to be erected in the squares, and decorative guns and sabers being used by designers for decoration of office interiors. Military maneuvers would move into a safe artistic space to become a performance, and the sound of the cannonade would be recorded on CD Chrome to oust hard rock. The possibility of utilizing high tech defense products would serve to
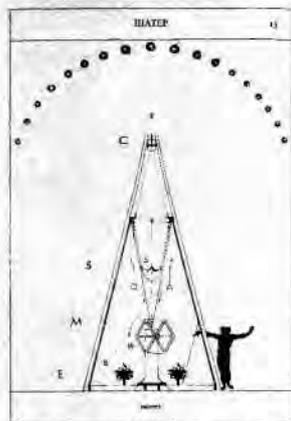
liberate creative imagination of the artist adding to the competitive value of Russian art.

Still another aspect results from the fact that contemporary art has rejected the role of an ideological weapon it formerly played. Such disarmament is fraught with the danger of art loosing its mission in the society. In this context, "conversion" becomes a rival of "disarmament" or "modernization", turning into a new search for a social function of art. Conversion is an escape from mental overloads, a metaphor of the present state of art. As such, it is very important at the moment and it can give ground for new discussions on fundamental problems of artistic practices.

Finally, the last aspect arises from the desire of contemporary art to turn into a direct gesture. This means that an artist using genuine military equipment to produce an art work performas a rite of elimination of evil. The bells once cast into canons will come back to the world of sounds as a pipe made of used cartridges. The interest of international public in the problem of disarmament will bring back the attention of the layman to art.

A powerful army, tending to unitary leadership, is a mighty pillar of imperialist mentality. It can be expected that Russians' conceiving of themselves as a nation is immediatley connected with CONVERSION. Thus, the exhibition will be the first step in the implementation of the program "Russian, Born in Russia, Russian-Speaking".

GIA RIGVAVA
A General Overview to Video and Media Art in Russia

Video and the new media art in Russia are basically characterisized as follows:

1. In the socialist ideologized society (the mechanism remains unchanged even today), the media is recepted as state-run mechanisms of power.

2. The means of media are extremely distanced from individuality, because they belong to the 'anonymous Other'.

3. Video and the new media hold specific place in the consciousness of the Russian artists.

Visible analogies in the problematics of art theory in Russia and in the West in the field of new media and video:

1. The state of things in Russia.
2. Analogical processes in Western art.
3. Visible future perspectives.

Nikita Gashunin

IGOR KAMINNIK, VADIM FISHKIN,
ANDRE SUMATOKHIN,
SASHA GRIGORENKO,
ANDREY SHCHELOKOV
Marquee

Spectator actor enters the MARQUEE
makes his way between dwarf trees,
                    level of Earth
mounts the platform, turns the wheel
                    level of Man
to hoist and spread out the screen,
to cover the skylight and adjust focal
distance,
                    level of Sky
to watch the sequence of angeled
skyscapes,
projecting from the top of the structure
                    level of Cosmos

конверсия

CONVERSION

Russian media artists working with military technology. A show curated by Marat Guelman, Guelman Gallery, Moscow

In Russia, a peculiar relationship between art and new technology has always been predominant: think only of Levsha, the left-handed smith of Russian folklore, whoknew how to shoe a flea, but with the help of technology that was primitive indeed.

The technical innovations were regarded as follies, something one really did not believe in. For a long time, the theory of N.Wiener was looked upon as a bourgeois pseudo-science; which is why the concept of new technology had an overtone of idealist philosophy. Even in the 70's, a normal audio magnetophone was considered dissident. The possibility of manipulating information with technology was the priviledge of the State. The only official centra for new technology were provided by corporations of the military complex. This is why "Conversion"

became synonymous for the "Eastern way" as opposed to the "Western way".

Nikita Gashunin's work "Global Ambitions", a sculpture filled with electronics and microprocessors, symbolizes a technical miracle put together from debris in the backyard. The moving sculpture reminds us of the phenomenal gift of the Russians to turn unusual the commonplace.

The works of **Savadov & Senchenko** unite the two directions of Conversion: to recycle Army property and to exploit the technology developed in the military factories.

As stated above, information technology was considered a medium only for propaganda, oppression, and conceit. **Gia Rigvava's** works "You can trust me" and" You are powerless" start from this notion. "You can trust me" uses the genre of the"talking head", sublimating the characters of massmedia: Jesus, Terminator, Gorbachev.

The relation of man and technology is revealed in the work of the **AES Group** (Tatjana Arzamasova, Lef Evzovich, Yevgeni Svjatskin). The work demonstrates the impossibility of organically uniting man with tehcnology: a tank, whose body has been dissected with the aid of computer, is being reclad into human skin.

gender/blender

ZOE SOFOULIS, VIRGINIA BARRATT
Women Remapping Technospace

Although it is frequently assumed that succesful engagement with new electronic media requires an unambivalent, uncritical and enthusiastic attitude towards the equipment, interviews with Australian women electronic artists and studies of their work reveal a diversity of attitudes and styles of relating to technology. Many women artists express critical concern for the contents and contexts of electronic artworks and aim at 'putting some guts into the machine' – using new media to explore embodiment, rather than abandoning the body for a virtual world. Cyberspace, and the real-world institutional spaces in which it is embedded and accessed are contested zones: they do not guarantee places for women, and those aberrant females who enter do so not as colonisers imposing a pre-set plan for 'the' future, but as viral guerillas in a libratory struggle to subvert the political and aesthetic logics governing the field.

ROGER JOHNSON
Music Tehnology and Gender

Gender is a powerful lens with which to analyze the meanings of music in our time, examining not just sexual content but a complex range of codes

and cultural activity concerned with identity, diversity, representation, and particularly with power. Media studies is also an important way to understand many of these same issues, most notably the profound effects of technologies on music and particularly its commodification and industrialization, which has become the dominant way to extend the ("masculine") power of the music and culture industrie

But the feminist project, like others addressed to race and multiculturalism, is understood not just as a plea for inclusion into this dominant power structure, but for a change in that structure in order to make it more receptive, diverse and decentralized. It is a struggle for meaning and for power and is most acute for the independent media artist, whose work has no longer the old ("masculine") competitive, ideological urgency of high art, nor a voice in the (equally "masculine") commercial marketplace.

However, these ("feminine") conditions of powerlessness and exclusion suggest important newer roles for the independent artist, particularly those working with new technologies and media. This agenda has long been understood by advocates for other excluded groups (women, racial and cultural minorities), and is essential now for meaningful artistic activity and continued creative access to technology as well. It includes:creating work which is both compelling and relevant to people's lives, building collaborative and open communities, fostering diversity and multiplicity of artistic activity, and continuing to be artistic innovators, even "hackers," with the emerging technologies. This is Jacques Attali's vision in Noise: The Political Economy of Music, a fascinating book about art, power and social action, whose ideas warrant a new look in the light of our technologies.

JOAN TRUCKENBROD

Gender Issues in the Electronic Arts Inform the Creation of New Modes of Computing

The electronic arts have their roots in the gendered society of the computer culture. This culture is comprised of a vocabulary, conceptual structures and strategies that reflect the male subsulture of computer hardware and software developers. The social construct of computing embodies a male orientation to the technical personality of the computing machine, the knowledge and skills necessary to utilize this machine, and the political, commercial, and militaristic apllications that have been developed. Consequently, women are "outsiders". In confronting the gendered character of computing, women have developed ways of using computers differently from the prescribed modes. Creative computer usage comes about through the process of women changing what is for them unsatisfying modes of working.

As in scientific computing, women in the electronic arts negotiate with computing different than men, and consequently have established different ways of injecting the computer into the creative process. These methods inform the evolution of new forms of art as well as computing. One alternative form of computing is a relational model that promotes a nonlinear process of exploration and experimentation, with interactive negotiating; visually, gesturally and verbally. The structural relationships are not predefined and thus stimulate the viewer to choose their own points of view, to create their own connections and establish their own direction. The computer becomes a catalyst. A second model is one of kinaesthetics in which the computer is capable of providing opportunities for integrated sensory experiences, facilitating a complete interplay of all of the senses. The computer is a multidimensional studio environment.

A third model of computing is one in which software and hardware can be personalized by each individual user. Each of us must be able to arange and personalize our own working environment like we do our studio, our kitchen, or our garden. In addition, software should be intelligent enough to generate processes and functions that are described by the user.

A final alternative model for computing uses structures and processes from nature as a model for computing. These models integrate the female voice and a feminist perspective into computing, creating a pluralistic environment.

HIGH&LOW**gender/blender**

VNS MATRIX / JULIANNE PIERCE,
JOSEPHINE STARRS,
VIRGINIA BARRATT,
FRANCESCA DA RIMINI

PathogenicVectors

Log In: VNS Matrix
Password: aberrant

Now connecting to host network RAMpage.

RAMpage: bentnet belladonna.stone.plant. 666 ? Welcome to CorpusFantasticaMOO! ?

Running Version alpha of CorpusFantasticaMOO

CorpusFantasticaMOO is a colonised body, where entities without number meet. You may not understand some of the language you encounter in this body, and it would be advisable to familiarise yourself with other methods of constructing meaning. Never assume that you are speaking to a member of a privileged class, race, gender or species. We provide mindnet access for entities with particular needs. What resident or guest entities say or do may not always be to your liking. Beware - there is no moral code in this *place*.

Type:
'connect <character-name> <password>' connect to your character 'connect Guest' connect to a guest character '@who' see who's currently logged in

connect Geneva Convention xtreme

Okay. Geneva Convention is in use

The Limen

You are at the threshold of the corpusfantastica. Seemingly infinite and infinitely small, neither here nor there, with half remembered snatches of your life or is it? It is darkly seductive here, and you could stay, but you choose to slide through the cartesian reality grid and enter the spaciousness of the corpusfantastica.

@who

BigBrain is in the Thymus Bar
sociopathic cyberslut is in the Lung Lounge Manko is in the Wandering Womb Matrix
Green Guest Wandering Womb Matrix
Oracle Snatch is in the Wandering Womb Matrix FireWalkWithMe is in the Wandering Womb Matrix

@look socio

You see before you a walking pincushion, hardly a piece of flesh that hasn't been pierced. The jewellery is a cross between Cyberdada circuitry and fishing tackle, useless, meaningless with a strange retro allure. The three breasts are a turnoff, mostly because they are eyeing you nastily. There is a permanent scowl on her face, and her pupils are the size of bowling balls.

@join sociopathic cyberslut

VNS MATRIX
All New Gen

The VNS Matrix (Josephine Starrs, Julianne Pierce, Francesca da Rimini and Virginia Barratt) emerged from the cyberswamp during a Southern Australian Summer circa 1991, on a mission to hijack the toys from technocowboys and remap cyberculture with a feminist bent. VNS Matrix create hybrid electronic artworks which ironically integrate theory with popular culture.

VNS Matrix have come to electronic art through photography, film, video, music, performance, writing, feminism and cultural theory. The inpetus of the group is to investigate and decipher the narratives of domination and control which surround high technological culture, and explore the construction of social space, identity and sexuality in cyberspace.

The project which they pursue is one of debunking the masculinist myths which might alienate women from technological devices and their cultural products.

They believe that women who hijack the tools of domination and control introduce a rupture into a highly systematised culture by infecting the machines with radical thought, diverting them from their inherent purpose of linear topdown mastery.

Their first action was the dissemination of the 'Cyberfeminist Manifesto for the 21st Century', which was placed in public sites, published in various academic, art and poular journals, and broadcast on community television and radio. The 6m x 3m billboard of the 'Manifesto...' has been widely exhibited.

Their current project is the on-going development of All New Gen, an interactive computer artwork, and installation piece which takes the language of the computer game as it's discursive context. The component parts of All New Gen are lightbox mounted large scale transparencies, audio works, video and sculptural structures. All New Gen's mission, as anarcho cyber-terrorist is to undermine the "chromo-phallic patriarchal code" (1)

and sow the seeds of the new world disorder in the databanks of Big Daddy Mainframe...

The VNS Matrix are continuing their interrogation of the codes of popular technologies is their textual project 'CorpusfantasticaMOO' which sites itself within the mainframe of the Internet, the worldwide electronic communication network or the 'information superhighway' as the merchants of hype would have it.

The VNS Matrix have exhibited in Adelaide, Minneapolis and Chicago and will tour to Helsinki, London, Toronto, Sydney, Melbourne over the next year.

VNS Matrix is a self-governing system(2), replicating in dangerous and unexpected ways, coming soon to a terminal near you...

[1] Richard Grayson, 'All New Gen' catalogue essay, Adelaide 1993
[2] Prof. Sadie Plant , Birmingham University, makes a correlation between the increasingly unmanageable and unpredictable proliferation of 'intelligent virii' in computer systems, and the rise and rise of cyberfeminism. See her paper 'Women, Drugs and Intelligent Machines', presented at the Adelaide Festival's 1994 Artists Week. She will be publishing a book on cyberfeminism entitled 'Cybernetic Hookers' in Britain later this year.

GREG GARVEY, CAROL GIGLIOTTI,
BRENDA LAUREL, JOAN STAVELEY,
ROB TOW

Pedagogy of the Oppressed: Women, Men and the Cartesian Coordinate System

Greg Garvey: There is an ongoing debate in the classroom, academic journals, and the popular press regarding significant differences between men and women especially in learning, using, and designing technology as part of a more general discussion of so-called "cultural studies". One such view is that the edifice of western science and technology is but only a 'constructed' artifact of the dominant white male patriarchy driven by the imperatives of expansionist monopoly capitalism.

"Pedagogy of the Oppressed: Women, Men and the Cartesian Coordinate System" continues this discussion by examining the statement: "The Cartesian Coordinate System is oppressive" overheard during the proceedings of the "Nano-sex" panel at SIGGRAPH'93. The title for this panel proposal also makes reference to Paulo Freire's classic "Pedagogy of the Oppressed". Freire describes a "culture of silence" in which the oppressed are submerged. He asserts that all human beings regardless of their circumstances can look critically at the world in a "dialogical" encounter with others leading to a new self- awareness within the social order. This awareness in turn leads to action in the attempt to be more fully human.

The women and men who embrace and utilize technology in their artwork are likewise engaged in a critical appraisal of their role in the technological and scientific order. By challenging certain assumptions, critiquing gendered constructions of space and interface and proposing alterna-tives (a feminist computer, non-Euclidean computer graphics) likewise reflects the will to transform and remake technology that is responsive to the range of human capabilities, limitations, needs and desires.

Carol Gigliotti: On animals, children, and seeing deeply
The impact of the Cartesian paradigm on the natural world has been immense.

How do the two most consistently oppressed groups in this culture, animals and children, fare in the context of the Cartesian coordinate system? Virtual environments (VE) and visual components of artificial life (AI) systems are two of the more recent additions to our efforts at simulating the natural world. Animals and children share a lack of integration into the pervading cultural constructions of that world. What effect will the present developments in the fields of VE and AI have upon the development and quality of life for these two groups?

Brenda Laurel: Among the brain-based differences between males and females that we know about, differences in aspects (of) spatial cognition are most significant.

Differences among cultures in everything from mathematics to cosmology also tend to hinge on differing understandings of space. Accommodating differences among people in the design of anything would seem to require a great deal of flexibility in spatial understandings and metaphors.

Rob Tow: There are many representations of spatial relationships in human culture, art, and science, both now and through history. All are abstracted tools of situations, and all work better for some people than for others. Rectilinear coordinate systems,

and their close cousin Renaissance perspective, are examples. Recognizing these differences, we should NOT strive for the mediocre ideal of some sort of "androgeny of geometry", but must instead build instrumentalities and interfaces that are richly multimodal in the way they empower people who are differently endowed.

Joan Staveley: The Computer Graphics model for three dimensional Cartesian coordinate space is an implementation of an invented method for the description of "real" space. People have been using 3D interactive computer graphics for a little over thirty years. This model for describing space is used in computer graphics because it works; it's practical. A lot of quality 3D computer graphics have been produced over the past 30 years, but no descriptive language is absolute. Cartesian coordinate space has its biases; it does some things very well and it neglects others.

For a variety of reasons Western-cultural and capitalist attitudes tend to falsely empower Cartesian coordinate space as absolute, and if not absolute then at least superior to other descriptive visual systems. A White heterosexual male point of view is dominant in this space and the pressures to create spaces, images, movement and narratives in a few limited styles reflecting the White male voice are great.

HEIDI TIKKA
A Dialogue with Hunger

"A Dialogue With Hunger" excavates a compressed image of desire from the history of optics and cinema as well as that of psychoanalysis. The spectator's desire constitutes the foundation of the cinematic apparatus that is used here to trigger the film projector. The female body as the site of the imaginary becomes the locus of the colliding forces of desire and violence. Simultaneously, the projection sets in motion a dispersion of spectatorial positions. Who is looking and who is being looked at?

Installation "A Dialogue With Hunger" is part of a series of work, in which I have challenged the pleasure of looking. This challenge is posited from a feminist point of view and elaborates the notion of gendered gaze commonly presented in feminist film theory describing the pleasure of looking and the pleasure of control allowed by the act of looking being made only available for the male gaze in traditional cinema, in which the female body is only presented as the object of the gaze. In my pieces I look for strategies for making this controlling gaze encounter itself and thus depriving the pleasure momentarily from it. Rather than an image to be looked at the installation "A Dialogue With Hunger" is intended to function as a lure, a trap for catching the spectator in the process of seeing him or herself being found out looking.

Heidi Tikka

The piece consists of a white podium with a stereographic viewer, a movie projector and an infrared sensor. When the spectator looks down into the slides the infrared sensor triggers the movie projector and the spectator becomes illuminated by the film projection. However, when the spectator looks up, the projection is interrupted. The projector thus functions in a double role: it projects the image but it also suggests the existence of a filmic apparatus as a controlling device. This control does not only refer to the technical aspects of illumination and lens, but also to the psychological power of the film as the site of the imaginary in which the desire for mother's body becomes replaced by the desire to see, but always remains unfulfillable. The images in the film loop reflect this process. The image of the infant being nursed fades into the recreation of the mirror scene in which I film myself through mirror. The latter also questions my identity as a female film-maker and as the other of myself generated by these layers of reflecting and penetrating surfaces. The stereographic image as the imaginary object of the gaze posits female body as the scene in which the violent forces of desire, fetishism, and anxiety collide.

CHRISTINE TAMBLYN

**She Loves It, She Loves It Not:
Women and Technology**

She Loves It, She Loves It Not is an interactive CDROM disc created by Christine Tamblyn in collaboration with Marjorie Franklin and Paul Tompkins. It contains texts, sound, movie clips and images about women's use of technology in the past, present and future. Over the last two decades feminists have identified men's monopoly of technology as an important source of their power; women's exclusion from access to technological prowess is a crucial element in their dependence on men. This project addresses this issue from several different angles.

The viewer accesses a series of screens by clicking a mouse. The initial interface is a graphic image of a daisy. Each of the petals of the daisy represents a loop of screens with a particular theme: Memory, Control, Power, Communication, Violence, Homunculus, Labyrinth, Interactivity, The Other, Representation and Ideology. When a viewer clicks on a petal, the loop she has chosen begins.

Each screen is composed of a headline, a block of text, a static image and several "buttons" that open up to various elements. The images are derived from various found sources, including comic books, a catalog of robots, magazine advertisements and art works. The text concisely analyzes the topic from the perspectives of cultural studies, sociology and film history. A continuously looping sound is also associated with each screen. Special animated buttons allow viewers to read handwritten letters, watch Quicktime movie clips (digitized at 5 1/2 frames per second for a defamiliarizing effect) or see a "footnote" text with more detailed information about a specific topic.

The text contains 84 screens and takes about an hour to view once in its entirety (in one possible configuration.) Because it is an interactive, non-linear piece, viewers can choose how long to spend with it, what order to view it in, whether to repeat or skip screens and whether or not to open buttons. The visual aesthetic of the piece has a handmade collaged look; we have deliberately avoided the slick sterility of much computer art. Its content combines aspects of an academic essay or documentary film with a poetic series of associated links between graphic, film, text and sound elements. Thus, the project serves as a prototype exploring some of the new potentials of the interactive CDROM format.

Both the form and the content of the work attempts to demonstrate how women might use and have used technology differently and how technology might adapt to female learning proclivities and female culture. An integral part of the project is the design of computer interfaces that are more user friendly for women. Because computers have evolved as tools built by men for men to be used in warfare, the current interfaces tend to have a violent, aggressive character. They are hierarchical, mirroring the militaristic male pyramid with its rigid chain of command.

Current interfaces also have a predominantly visual bias, privileging the male gaze and male strategies for control through surveillance of territory. Interfaces designed to be operated by women ought to be multi-sensory, personal, affective and dynamic. Our approach to redesigning the interface involves the creation of a female persona in cyberspace who serves as a guide to the system. The navigation buttons on each screen appear inside an image of this persona, and her voice gives instructions about how to proceed.

By envisioning a more productive relationship between women and technology, the project will benefit women who are using new technologies in a variety of academic fields and artistic endeavours. It is designed to be exhibited as an art installation as well as to be used as an instructional resource for women students by providing positive alternatives to the negative stereotypes regarding women and technology often inculcated in early educational experiences. Just as feminist theorists have stressed the importance of women having access to the position of speaking subjects and "having a voice" in our culture, it is similarly important for women to have role models for computer literacy as computers become an essential communications tool.
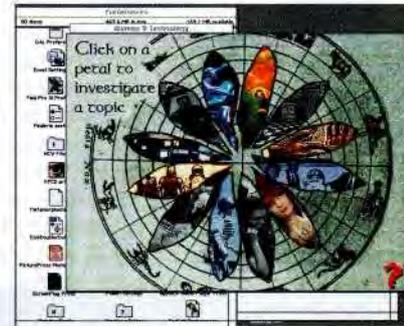
Christine Tamblyn

REJANE SPITZ, PAUL BROWN,
ACHA DEBELA, MARIA FERNANDEZ,
CHITRA SHIRAM

Transcultural Approaches to Electronic Art - Do We Really Care?

Rejane Spitz

In his report on the study of pictorial perception among African subjects, William Hudson (1967) says that we take it very much for granted that methods which are only moderately successful in our own cultures will prove equally, if not highly, successful in an alien culture: "We fall into the error of thinking of the black man's mind as a tabula rasa, which we have only to fill with the benefits of our own cultural experience in order to promote whatever objectives we may have in mind. We forget or ignore the fact that the black man possesses his own indigenous culture."

During recent years, many artists have addressed the issue of cultural diversity as part of their discussions on Electronic Art. Although the vast majority of artists claim the need for a transcultural approach, most of them have taken a superficial look at this complex problem, turning attention away from some of its more crucial points. Their discourse focuses on the possibilities for providing artistic bridges across different cultures, while their attitudes and works reflect, in many cases, a typical ethnocentric view.

The discussion aims at promoting a debate on transcultural issues, as one of the major challenges electronic artists face today. In a world of social, cultural and economic disparities, how can technology meet basic human needs in both developed and developing countries? Which are the dominant cultural values that underlie computer-related technologies today? What is the impact of new electronic technologies on Third World nations? How can we minimize technological dependence and cultural domination, when 30 developed countries – with less than 30% of the world's population – account for approximately 95% of the world's scientific and technological production?

Paul Brown: The Information Superhighways and Cultural Imperialism Ownership and Access to the Media

In 1986 I took my first round-the-world trip. I was shocked to discover that current affairs and news television was the same everywhere I went. The reason was obvious - all the tv companies were using the same electronic production devices, things like paint systems, caption generators and digital video effects generators. These systems contain a define (though often overlooked) signature which imposes itself on the content of the work produced. In modernist terms this could be proposed as the "essence" of the medium. Turn down the audio and TV screens in Singapore or Bahrain looked identical to the offerings of NBC, CBS or the BBC. This experience stimulated my thinking about unintended forms of culturalimperialism and domination. I do not doubt the ethics of the designers of electronic graphics systems. It is highly unlikely that they intended to curtail the creativity of indigenous cultural groups. They did, however unwittingly, build their own cultural perspective into the systems they designed. The rapid growth in the use of these systems

(along with more traditional production tools and media) has produced a global culturally homogeneous television. It is as if a world-wide war has been fought and won (by the First World) or lost (by the Third) a few seem aware or perturbed. In fact when I discussed these issues recently one American delegate was indignant. She argued that anything that homogenizes human activity was beneficial (since it should increase harmony) and that my claims for cultural imperialism were negativistic (socialist?) rhetoric. Nevertheless the experience of global TV gives us a modern high-tech example of First World domination that ranks, in my opinion, alongside the eurocentric "education" of the Australian Aborigine. This often included the separation of families and the forced adoption of black children by "right minded" white Christian families. These policies failed and the massive harm caused is well documented. Nowadays there are few who defend such atrocities. Why then do so few seemed alarmed by the ubiquity of high technology and its intrinsic value systems and cultural perspectives?

Maria Fernandez: Technological Diffusion and the Construction of a Universal Aesthetic (Discussed with reference to Latin America)
Discussions about the globalization of culture often assume that both technological development and the diffusion of technologies from the developed countries throughout the planet are "inevitable". Two explanations are frequently given for the "inevitability" of technological diffusion: The first is the rapid rate of technological

innovation. This argument usually assumes that technological development is independent from other aspects of culture. The second explanation is the unquenchable desire of the people from developing countries for advanced, primarily Western technologies. This suggests that technology possesses intrinsically seductive and redemptive values which drives peoples willfully to abandon their cultural and artistic traditions.

Regardless of desirability, no technology is ever distributed uniformly. The history of Latin American art indicates that the choice of electronic technologies as mediums for expression is mediated by social and historical factors. In Mexico for example, while computers are used in many urban businesses such as banks and travel agencies, the number of artists cognizant of the latest developments in electronic imaging technologies is limited to a handful. The widespread belief in the redeeming aspects of technology is due at least in part to unfamiliarity of "first world" critics and practitioners with social and economic realities other than their own, and to a long standing practice of presenting technological developments in humanitarian terms. In order to evaluate the democratic possibilities of new technologies it is necessary to examine the production and consumption of both technology and science.

Like scientific practice, art has been believed to have universal values. This position implies that artistic production is independent from its sociopolitical context. The argument has been made that with the advent of feminism, post-structuralism, multiculturalism and the multiplicity of aes-

thetic choices made possible by the computer the canonization of works of art has become impossible. On the contrary, I contend that at the same time that traditional aesthetic canons are being challenged, new canons are being created. I suggest that in addition to the rapid rate of technological development, the construction of these canons is in part a response to dramatic changes in the structure of the world's economies and to the seemingly unending migration of people from former colonies to Europe and from culturally dependent areas to North America.

Chitra Shriram: Transcultural Approaches to Electronic Art
In the history of human culture there is no example of a conscious adjustment of the various factors of personal and social life to new extensions except in the puny and peripheral efforts of artists. The artist picks up the messages of cultural and technological challenge decades before its transforming impact occurs (Marshall McLuhan)

What is meant by a transcultural approach to electronic art? Is 'transcultural' to be read as something that effaces difference accross cultures or as something that is constituted by it?

The conflict between geographical, cultural rootedness and the space defying freedom of the Internet maybe at the heart of the problem of conceiving a transcultural approach to electronic art.

The ethos of the computer industry in India emanates from the western world, and employs the same market-

HIGH&LOWglobal/local

ing and training strategies. Is this fertile ground for creative assimilation of a foreign technology or is this another avenue for cultural colonization?

How have the technologies and language of photography and cinema transferred to the Indian subcontinent? What processes of imitation, subversion, appropriation and creation were released ?

It is not possible to talk of an Indian approach to Electronic Art with the same hindsight clarity with which photography and cinema can be talked about. But a consideration of individual works and culturally moulded sensibilites is possible.

In the minutae of such considerations, we can perhaps realize the truth of McLuhan's statement and go beyond the bottleneck of 'style'.

Acha Debela:
Rejane invited my to contribute to this panel by expressing "the utmost eurocentric modernist jargon" ... "from a first world perspective". I would like to go further and suggest that we could all become victims of the ubiquity of this technology and its inherent value systems. Ironically it may be the "deprived" third world communities, who do not receive access to the hallowed high-bandwidth information highways, who survive with at least some semblance of freedom and independence. Indeed we could reasonably argue that the inhabitants of the First World have already been enslaved by their addiction to technology and its products: material information and wealth.

The burgeoning computer technology and the development of user interface softwares particularly tools meant for use for computer graphics have a historical precedence that are woven with problems and dilemmas specially related to the practicing artist. The rather complex issues surrounding the evolution of tools are to

date results of culturally biased world outlook. Until relatively recently, User Interfaces have generally been built by and, some may argue, for white males who are well educated and between the ages of 20 and 40, ignoring the diversity of the human race. Hence the User Interface development community along with software designers in computer graphics and others in design, do have and often incorporate certain biases. The need for consideration of the UI and GI developers understand that, their targeted audience is increasingly diverse, hence the need to recognize and incorporate cultural nuances and of cultural diversity not only in language, terms, icons, and colors but in every aspect of User Interface design. Approaches to metaphors, mental model, navigation, and even the style,look and feel of products should be part of the effort towards a better human machine interface and its design. Where the idea of developing tools was the sole responsibility of the software engineer,it is advisable to have the human factor specialist, the focus groups to come to grips and include a multi-discipline team of designers. It is also essential ,if not crucial that graphics tools are developed in consultation with practicing artists. Artists whose creative out put depends on how well a tool and or graphics software is designed, or how well it can perform both simple and complex problems of image making. Hence the idea of a team of interdisciplinary engineers, and artists are necessary for a successful product. Beyond the problem of design biases in UI and GI, there exists a serious problem of assumption and attitude by both developers and owners of the technology that what is good to us should also be good to them. Beyond that exists the larger problem of technology exchange on a global level in general and the former colonies

and their colonizers, namely the problem of the so called North South axis in particular. The exchange on many levels indicate that what matters most at any level of exporting technology is profit and political expeditiousness not culture or human value.

When human creativity and cultural values are put on a pedestal to be looked at or judged as high and low, the challenge becomes whose pedestal and by whose definition and whose standard. The "third world" contribution is crucial if the human race is to benefit and nurture the edge of electronic art towards an enriched human experience in all its diversity and quality. To this end the role of the user, creator artist as a mediator and a diplomat of cultural exchange becomes an essential ingredient that becomes a voice. A voice that cares.

LILY DIAZ
A Simultaneous View of History – An Examination into the Landscape of History

Much of the information (data) about pre-Columbian and early colonial Latin America which has survived to our days has come to us in the form of reports and narratives created by civil, and scientific agencies under the auspices of the Spanish empire.

It is a fact that in many cases the agenda that permeated the gathering of this data, was that one of maximum exploitation of resources in the colonies. Any attempt at understanding the process through which colonial history is encoded should begin with a deconstruction of the hierarchical structure in which the data is contextualized.

This can be done through the collection of a sample of data into an hypermedia 'assemblage' that allows for a network-like configuration of elec-

tronic space. The space in such config-uration provides the ability to trans-verse the data in a non-linear, interac-tive, manner. Because we can forge our own trajectory, we can examine the data in an associative manner which fosters the creations, by the reader, of new relations among the di-verse elements. Engagement in such task can enhance our ability to discern historical constructs which deviate from the established (or sanctioned) historical framework.

Further investigation into the in-formation-gathering techniques uti-lized, such as observation and repre-sentation via narration and illustra-tion, and its incorporation into the network in a manner in which it can be accessed from any point in the sys-tem provides us with the ability to cre-ate a dynamic landscape in which the concept of point of view is no longer applicable, except as an identifier of our diverse paths through the data.

In additon to these, acknowledge-ment of the technologies utilized for the production of this information, and their role in the process of he-gemony, could lead to a disclosure of the conditions which create (and maintain) intellectual colonialism.

SADHNA JAIN
Identity Crisis – Cultural Mapping

The desire to travel has accelerated into a frenzy satisfying our fantasies of uncovering unfamiliar places, a de-mand for the exotic and confronting rituals of the primitive. Technology has permitted travel at phenomenal speeds, ironically shortening the length of stay in territory which ulti-mately remains foreign. The western traveller confronted with an alien en-vironment observes an array of 'ethnic rituals' through a range of sophisticat-ed electronic products, then frantical-ly returns home with each recorded

image serving as a measure of his/her western supremacy. Experiencing the 'other' really occurs.

The electronic gateways continue to channel traffic along all possible routes, yet the traveller approaching from the opposite direction is con-fronted with these gateways that rap-idly metamorph into barriers. The West becomes a frontier inpenetrable without the correct data and suffi-cient information. Each gateway se-lects, records, and tags the individual. Once within the walls of the fortress each movement is discreetly observed, the act of surveillance embedded within local environments carefully observing the identities of those that are alien – Distance is encouraged – Interaction is not. For the visitor, routes are preset, environments con-trolled, orientation determined by those in control. The visitor has ar-rived but the culture remains remote. Identities are preserved.

CECELIA CMIELEWSKI
Narrative and Intervention

Within the parameters of convention-al narrative displays, several interven-tions have occured in Australia which point to the possibilities of technolog-ical innovation being used in order to re-tell history. The three examples which will be discussed have an almost "underground" sensibility, although they cover several, very different sites within Australia.

The videos Dora's Revenge and The Three Pigs both directed by Australian film and video artist, Tony Kastanos with a group of then year old chil-dren, and a compilation of video pro-duced by Aboriginal children of the Central Australian community of Erna-bella, are presented to illustrate their spontaneous wish to intervene in dominant narratives and provide al-ternative versions of accepted myth.

They both use humour to challenge the orthodox reproduction of values.

There is a certain sense of empow-erment in the examples provided, which although not technologically "driven", use technology as an inte-gral aspect of the pieces. The cartoon length becomes the domain of the child instead of the other way round. Aboriginal children look at and play around with their own images rather than, yet again, becoming the subjects of the unrelenting gaze of the anthro-pologist, the filmmaker and such like.

A different site at which technolo-gy and art will be active is at a large public site – a museum in Sydney Aus-tralia. In this space the audience will be presented with a personal oppor-tunity to consider history through an interaction with the voices and visions of those previously muted by the vic-tors of history.

The site is cognisant of and re-sponds to the potential presented in the dialogue between art and tech-nology. The sophistication of technol-ogy, in this case, allows an unusual in-teraction between the viewer and the viewed. Sound is used to evoke the lost subject, not so much as giving it a place in the script, nor necessarily doc-umentation, but to evoke a sense of the existence of those tramelled, ex-tinguished and forgotten by history. These devices consciously provide the opportunity to step around the con-ventional, in this case the colonial texts of the nineteenth century muse-um.

HIGH&LOW**global/local**
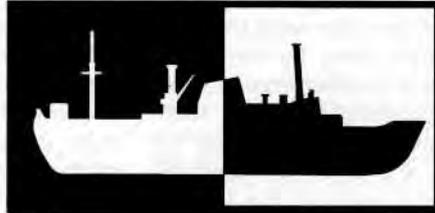
MS STUBNITZ
The Baltic Tour

MS Stubnitz, a former deep-sea fishing trawler, was restaured during 1993 into a mobile forum for the arts. The ship has been equipped with a spatial and technical infrastructure for cultural production, studios for design and new media. Under the patronage of the Council of Europe and the Lord mayor of the City of Rostock, the ship launched cultural projects in Germany in 1993.

1994 is the year of MS Stubnitz' Baltic Tour. From July to September, the ship cruises the Baltic Sea, providing cultural platforms for different events: St. Petersburg International Forum, Malmö Baltic Jubilee, ISEA'94 Helsinki and Hamburg. During the Baltic Tour, a cultural contact forum for the Baltic countries will be founded. The ship will activate cooperation between the cultural interest groups of the Baltic countries by organizing Contact Media workshops during the tour.

In ISEA'94 Helsinki, MS Stubnitz will present works from the Baltic Tour'94. The show of permanent works and artist-in-residence projects will be completed with works by Baltic artists from St. Petersburg, Malmö and Helsinki. The main focus of the Baltic Tour works is on ecology and environment.

UDO WID
What do ELFes sing?

Definition
Exreme Low Frequencies are elctromag-
netic waves, generated by athmospheric
discharges in weather fronts (sferics) or by
electrotechnical events (technics). In the
range of neuronal frequencies (EEG,
EMG), they are considered to be the cause
of weather disease and the trigger of the
biological clock.

Instrumentation
ELFes are catched by an frame antenna
(on the roof of the trawlhouse), selected,
amplified and pulses counted per second
over a certain amplitude.

Evaluation
The numerical material is examined for
nonlinear chaotic regularities by means of
the theorem of takens. The fluctuation of
this regularity is looked out for.
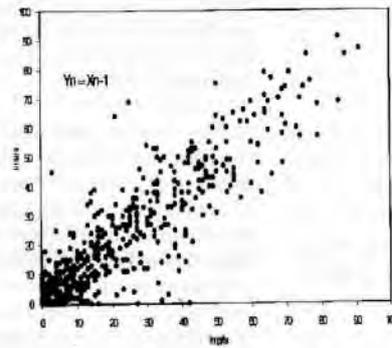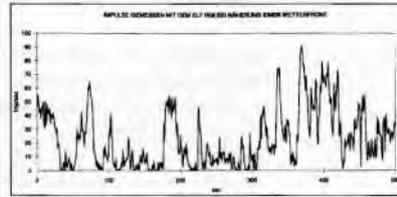
THE BALTIC TOUR EXHIBITION
Permanent works / Artist-in-residence
projects / Works from the Baltic countries

Nicolas Anatol Baginsky (Germany) *Surviva
07*, A-life installation
Daniela Plewe, Horst Schulte (Germany)
View Point Run, interactive computer
installation
Tassilo Blittersdorff (Austria) *Seekarten -
Sehkarten*, installation
Reiner Görss (Germany) *Open and closed
System / The Decision*, installation
Peter Dittmer (Germany) *The Midwife 2,
Wet Nurse*
Udo Wid (Austria) *What do ELFes Sing?*
Extreme low frequency project
Niels Bonde (Denmark) *Market Theory for
Beginners*
Ulrike Gabriel (Germany) *Work in progress*
Art-Pilot Centre (St.Petersburg) *Biopolitics*
Tommi Grönlund (Finland)
ULTRA 3 (Finland)

ISEA/ONLINE

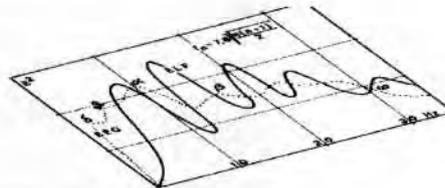The worldwide enthusiasm in network publishing has reflected in the way ISEA'94 conference started out. A W3 server providing information to Internet users around the world was put up alongside the existing home page for the University of Art and Design UIAH. The aim of I/O, the online pre-conference, has been to establish the themes of the conference among the participants and to provoke the discussion beforehand. If not a vivid discussion, I/O has started out serving as a database to the works in the art exhibitions and and an archive of the abstracts in the papers and presentations sessions in ISEA'94.

Stories, images from near and far, between the East and the West, are filling the pages of I/O. The stories of **Rosa Liksom** on days of Sovjet rule in St. Petersburg, a report of the Royalist Party's Court in Estonia by **Kaja Grünthal** and **Ninna Kuismanen** and many more to come.

During ISEA'94, many projects take place in I/O. A Midi-concert, a daily newsbulletin to be viewed around the world, discussion and debate on the open dataways. A shadow exhibition takes place in the mailARTbox... anyone with email can send images, texts or sounds to the virtual gallery.

These are the addresses:

http://uiah.fi/isea/ for the whole publication

isea-forum@uiah.fi to take part in the discussion

isea-midi@uiah.fi to rearrange the notes written by Simo Alitalo

isea-mAb@uiah.fi to send a masterpiece to the mailARTbox

ARTEMIS MORONI,
JOSE' AUGUSTO MANNIS,
PAULO GOMIDE COHN

The Electronic Carnival

The ELECTRONIC CARNIVAL is a network project that will take place all over the world from August to November, with a grand Openning Ball – a Carnival Cry – during ISEA'94. This network event will be hosted by UNICAMP – Instituto de Artes, in Campinas, Brazil.

To join this project, participants should create as many characters as they wish and subscribe them to the following list:

carnival_l

Characters will be introduced from all messages that arrive to the list. If a character wishes to communicate in private with another character, he should inquire about the availability of that character's address by sending a message to the list manager. Characters whose authors have not explicitly authorized the list manager to identify them will not have their address sent to other characters. Still, nothing keeps a character from trying to obtain another one's address through public messages: persuasion and seduction are part of the game. If two or more characters do communicate in private, we ask that messages be copied to the following list:

private_l

so that they interact in several ways: linearly in time, in the order of message arrival; or by interactions of characters, in the order of specific exchanges; like in a hypertext.

The Ball
A one day Opening Ball will occur during ISEA'94, when the characters around the world will be invited to act. ISEA'94 attendees will also be invited to create characters and join the body.
To join, please send a message to

listserv@cesar.unicamp.br
with
subscribe carnival-l

WOMAD@HELSINKI

Jah Wobble's Invaders of the Heart

1978 saw the release of Public Image Limited's eponymous single. At eighteen years of age Jah Wobble's (John Wordle) heavy bass sound was established in the first ten seconds of the track. Having left P.I.L , Wobble's collaborations mixed shortwave radio collage, heavy dance grooves, Islamic and African sounds with trance-like atmosphere. His music was the forerunner of today's "World" hybrids.

Released in May 1994, Jah Wobble's Invaders of the Heart's new album, "Take me to God" is Wobble's most ambitious album featuring a stunning array of artists, always underscored by that fundamental bass sound. The name Invaders of the Heart comes from ancient troupes of dancers and musicians who could literally invade the hearts of tired travellers who came to them, using music in its original form as a healing source.

Shriekback

Shriekback started life in London in the year 1981 and received much critical acclaim for their innovative smeltdown of dance rhythms, reggae sound perspectives and bizzare wordplay. In 88 Shriekback collapsed for a while coming back together in 92 to record "Sacred City" Their new formation being a rich loam in which the Shriek aesthetic could flourish and sprout new cultural hybrids. This 1994 band hailed by many as Shriekback's best incarnation yet is an entirely unique live event. The music is groove-based feral post-post modern rock'n'roll, Cyber-Folk , featuring an unprecedented collision of such instruments as Saz, Harming tree, Cumbus, Didgeridoo and Reco-reco - "post apocalyptic music that you could play after the apocalypse."

Trans-Global Underground

Formed in April 1991 as a DJ collective, fusing world music into underground dance beats and rhythms. Since forma-

tion, the band's debut single, "Temple Head" has become a club anthem world over. Although not wishing to be linked too directly, they appear to be leading a dance-music movement of "ethno-techno"– the fusion of global sounds, beats and rhythms into contemporary club sounds. The band core is Mantu, Count Dubulah, Attiah Ahllan and Natacha Atlas – (Belgian singer/songstress who sings in Arabic, Hindi, French & Spanish), live they are joined by the vibrant and colourful line-up of T.U.U.P (The Unprecedented Unorthodox Preacher) – African storyteller and rapper, Neil Sparkes – beat-poet vocalist and Larry Whelan, a clarinet/flute wizard. - "...this London-based crew of multi-national magpies sound like a mighty disco remix of the United Nations."

The bands will play in the WOMAD@Helsinki Festival, focused on ethno/techno at the start of ISEA'94.

Trans-Global Underground

nethics

JEFFREY TAYLOR
The Net Effect

The potential for democratic empowerment that the Net can imply has already been tested as some begin to live out McLuhan's prophesied redemption through electricity. The development of various FreeNet systems, for example, suggests that universal access and suffrage are economically and politically conceivable, as individuals gain direct electronic access to strategic information and to the brokers of power. The Net can be the bi-directional conduit necessary for the mobilisation of an informed citizenry.

However, the unrestricted *laissez faire* approach to information provision on the Net also implies an inevitable shift from the civic to the commercial, as information, equally available to all for the exercise of effective citizenship, is diluted and pushed aside by market forces discovering and dominating this new enterprise arena.

As others before who set out to create a revolution, and instead created a market, Net enthusiasts are testing the water for free so that major commercial interests can safely wade in. The Net has already proved itself an effective market place for pornography and propaganda.

Without an agreed regulatory constitution, the future electronic superhighway is for gamblers, entrepreneurs and big business, as email becomes junkmail, voting becomes market research and information becomes advertising.

AXEL WIRTHS
Artistic Electronic Networking Experiences with the first Mobile Electronic Cafe International, Casino Container

In 1992 the Casino Container was built as a mobile futuristic Café des Artistes by German designers and in collaboration with Axel Wirths, Ulrich Leistner and Sabine Voggenreiter the architectural structure of the Container changed into a network hobo for the ECI. During a journey from Cologne via Kassel to Venice and back to Cologne the crew started to work on experimental solutions for public spaces in the media age by redefining them as an extended virtual area and elaborating electronic nomadism as an upcoming way of life.

About 80 projects were developed in cooperation with network partners in Los Angeles, Toronto, Paris, Lyon, Helsinki, Aarhus, Cologne, Graz, Sydney, Fukui, Tokyo, and others.

As a meeting point and Café des Artists the Casino Container offered hospitality to the electronic travellers, the artists and the people in the different cities. Trying to combine the real and virtual world, the crew entered new areas which were never touched before. In times of a global information society with its growing tyranny of privacy in closed chambers of one-way-communication the necessity for breaking through the barriers of fear against the alien into a real travelogue is more evident than ever before.

The possibilities and experiences of artistic electronic networking can be presented by making clear what is possible and what is mere media mysticism, what is interesting for public and what should have happened better inside an institutional media lab, and of course what could be the future for an international cooperation in art-networking. More than 50 artists from all over the world have worked on these different materials and they represent the state of the art of network-art.

DERRICK DE KERCKHOVE
Ethics and Political Correctness

In principle, it is a good idea not to jump to conslusions, especially ethical conclusions, in times of great social and cultural change. We are in such a time, and yet an ethical imperative is developing in various guises, whether in political correctness, fundamentalist attitudes, anti-smoking campaigns or recycling crusades, or any other behavioral groupware. Some trends, such as 'political correctness' , multiculturalism, social responsibility movements in professional societies and even in free enterprise, talks about collaborative rather than competitive ventures, new gender relationships and attitudes, indicate a general orientation to a radical mood change. Part of this phenomenon can be attributed to 'population implosion': thanks to media, people are exposed to each other in greater numbers, with greater frequency, greater intimacy and greater impact. We are thrown to the face of situations that do not, at first, concern us. The media bring us to the world just as much as

they bring the world to us. They make each one of us commensurate with the planet. Just as we are responsible for our own welfare and happiness, we are becoming responsible – whether we are willing to recognize this or not – for that part of us which extends far about and around the Earth. The self-centered ego is now calling for a counterpart in the world henceforth perceived as an extension of self. Furthermore, our minds are being extended very far and wide and fast by our computerized technology. The ecological consciousness is not only a matter of global hygiene, it is also the best metaphor for the expansion of our minds to global proportions. This technology is approximating the mind and enabling it to command material change in real time. So much of our technology is geared to information-processing rather than industrial production that more than half the world's population is engaged in activities more closely related to mind than to matter. New technologies are now preceded by popular metaphors such as 'virtual reality', 'information highway' , 'personal digital assistants' which turn into self-fulfilling prophecies. This implies that the way we think and the way we shape thoughts with language now is endowed with transforming power. When you can do (at least by simulation) anything you want, the question ceases to be what you can do, but what you want to do. As we move from a culture of archiving (oriented to the past) to one of programming (oriented to the future), we may discover a new urgency in thinking up the 'right' metaphors. It may be more urgent than ever to practice collective positive thinking when global mood changes can go either way. The word is not out yet on the fall of the Wall, the crumbling of all walls, for that matter. Getting rid of guilt, paying increased attention to other people's voices, staying open, expanding one's mental proportions to the new size of other people's voices, staying open, expanding one's mental proportions to the new size of our collective body, consulting one's body and the body politic for proprioceptive information about the state of things generally, may be among some suggestions for grounding personal ethics in a democratic and sustainable development.

TAPIO MÄKELÄ
Electronic Space: an Imaginary Conquest

The utopian rhetoric that is characteristic to discourse on the electronic arts bears a certain resemblance to narratives of conquest. Electronic spaces are thought of as uninhabited areas, where our corporeal bodies and practical politics literally loose their ground. These spaces are often described as a newly found terrain for democracy, a McLuhanist democratic network for improving communications, deepening experiences and strengthening democracy.

The reason for me to use the rhetoric of colonialization in this paper is linked to the following argument, which I hope will be debated. I claim that electronic arts, and especially the written discourse around it, are simply continuing the modernist project. Beginning with the early days of colonialization, the western concepts of subjectivity were based on projection on other cultures and a self-contained, self-centered will to power. As Berger, Foucault, and others have pointed out, the control was often optical, and Simon Penny sees Virutal Reality as the latest stage of employing the Renaissance Perspective.

Thrill of the conquest is to live on the frontier between the self and the unknown. There has been a dual history for this frontier: a physical and an imaginary one. A continuous will to project oneself outside one's corporeal body. This usually takes place by using physical murder and technological discoveries to achieve economic and geographical power under auspices of an imaginary concept. An interesting shift occurred in the sixties, when a bunch of WASP males turned to Zen Buddhism and began a search inside one's body, which, nevertheless, was seen as a space. Timothy Leary was one of the entrepreneurs who got fed up with that project and continued his search inside the computer. Different ways of exceeding corporeal limits in search of an(other) self? This projection goes on with Virtual Reality and, as far as I can see, most of the electronic arts. The works that transgress this projection are usually those that are consciously made to underline that process. Thinking about Lynn Hershmans's work (Lorna), where the male (colonialist) gaze becomes an object of criticism by focusing on the way media allows this way of looking.

Modernism in the electronic arts is based on politics of sameness. Postmodernist projects, to which I would include at least feminism and 2nd world ethnic movements, have critically examined identities and differences. Paying attention to the medium itself has made most of electronic art seemingly genderless. It could be claimed postmodern because of its ability to transform into the identity a user or a viewer desires, but it is very rarely possible. Just think about the female figures in computer animations, or the modernist computer graphics... The images could be claimed postmodern on the basis of the mixing of styles, exploitation and amount of citations. As long as the interest in electronic art is focused on interactivity or the medium, it remains helplessly uncritical and modernist. That does not need to be so. I suggest a project of decolonializing the electronic space.
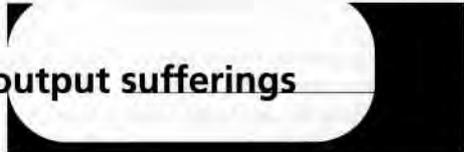
output sufferings

JAMES WALKER
Computers, Painting and Ambition

Some artists using electronics take for granted that the art that will be significantly new is going to emerge through new technology. If they look at a painting, they see a medium that doesn't do very much except sit on the wall. Old medium, old ideas. The new media involve intelligent and ambitious systems, radical shifts in our thinking. So it's natural to expect radical and impressive art, too.

Working as a painter who also uses computers, I am more sceptical. The art of painting is built on asking questions about what you see, and the process has the feel of a stumbling search. Obsolete? During the sixties and seventies we had exhibitions with "beyond painting" in the title. Kinetic, Op, Minimal, Conceptual, all mixed make-believe and pseudo-science to suggest a future where only "de-materialized" art would be possible. In fact what evaporated wasn't the "art object" but the credibility of this way of thinking, discredited and soon forgotten because the work with real punch and ambition proved to come from painting.

As well as finding another country for art – albeit a virtual country – the visual creativity of computing can function just as well within traditional media. The given technology of a painting – flat surface, nothing moving, no sound, no buttons or head-set, not even a plug required – is unimpressive, but it can whirl into life through the touch of colour, the dance of line, the stare of a face. At the Minneapolis conference last year the neighbouring museum held a small exhibition of Matisse's graphic work, its vitality and simplicity a reminder of how far the computer graphic exhibits (mine included) fell short.

The technophobia of the mainstream art world is the routine excuse for the failures of computer works to be as impressive as they should be. But on exciting, sophisticated technology is just the starting point. Picasso on an Apple II might still be interesting. Whatever else is possible, a fusion of computer techniques and painterly sensibility shouldn't be discounted too hostily. If there are frontiers in art they certainly aren't where you expect them to be.

CYNTHIA BETH RUBIN
Output Sufferings: After the Virtual

Cynthia Beth Rubin

For those of us who love color, texture, and form, but never quite developed a comfortable relationship with paint, canvas, wood, or other non-virtual materials, the electronic age promised to be our savior. We could be free muse over complex visual relationships and invent new meanings, and leave the dirty stuff to some one else.

But the dream never came true, or hasn't yet. We still have to show the images, somehow, either electronically, in projection, or in hard copy. And those of us who turned out backs on the problems of output paid a price. Our work just did not live up to its potential. Or rather, it did not live up to itself. We ended up exhibiting replicas of an electronic "original", sharing a cheap (or not so cheap) imitation of something that otherwise was not sharable.

Finally, we are up against the eternal and inescapable question: does the form of presentation carry meaning? Are we forever stuck in the world of art-objects? And if this is in fact the case, what is the best way to disseminate the work that we do? Are we in a risk of becoming too much a part of the mainstream artworld that so many of us are happy to escape?

ʹfuturics⟩

JEFFREY SCHULTZ
Hyperformance

A man exits the gilded Chemical Bank Automated Teller Machine at 14 Wall Street in Manhattan. He is dressed in an Armani shirt, Fendi tie, Body Glove surfing trunks, and Leader swimming cap and goggles. A head-mounted microphone, which is connected to a cellular telephone in his pocket, sometimes completes his ensemble. He's on Rollerblades that are equipped with 80 millimeter 78 and 81 A Hyper Shock wheels. He executes military maneuvers with a metal sabre while he skates his way to another ATM.

This is science fiction this is not.

This Hyperformer rollersurfs the terrain of the city, weaving his way through taxis, heating grates, trucks, oil splotches, busses, cigarette butts, pedestrians, and other surfactants. He surfs from one ATM to the next, and the next, and the next. At each machine he uses his card to check his balance. He then collects his receipts. As he leaves each ATM, he calls his personal answering machine via the cellular phone while the head-mounted mike records the rhythm of his breathing patterns as he makes his way to the next ATM. He hangs up before he checks his balance.

After he has completed his performances, he makes fragmented digital maps of where he's been, which are then uploaded onto America Online.

The Hyperformer is an investigative tool with which to unpack various meanings that circulate through culture. He seeks to forge and maintain a variety of connections, exploring the always-intermediate interconnectedness that increasingly characterizes our experience. He attempts to interpret and filter a variety of issues, including: the alchemical aspect of interacting with an ATM; the use of swimming and surfing metaphors in the context of information technologies; and the dispersion of identity; among others. The outgrowth of these links is a hybrid organism coupled with a hybrid analysis, the combination of which works toward developing navigational tools for the emerging cultural spaces of information.

STEPHEN S'SOREFF
Art Futures

Computer Aided Art will open new areas for the visual artists in the near future. This paper explores some of CAA's potential in fluidics, the search for intelligent life, crystallography, thin screen TV, and art in space.

Experience, however, is made conscious by fusing old and new meanings. In art the past and the future continually fuse, new concepts become old certainties.

Karl Friedrich Gauss, mathematical giant of the 19th Century, believed intelligent beings probably exist on the other planets of our solar system. He proposed signalling to them, in the 'universal' language of geometry, to begin a dialogue.

Converting a section of the Siberian forest to a huge blackboard he would have created an enormous geometric solution to the Pythagorean Theorem, a triangle planted in light-colored rye against the dark pines, nine miles wide...

A similar idea was proposed, here in America, this year, to be executed near Amarillo, Texas. A mile-square star to be made visible either by selective harvesting of several fields of wheat, or by diverting the waters of a local river into a system of star-shaped canals. The potential patron of this signal-to-space, however, has hesitated. He has explained he felt there was a small but distinct possibility it might work...

Jeffrey Schultz

Practical philosophy is based on ignoring most 'facts': ideas proposed before their time (often, in time, coming-to-be) have traditionally been the province of the science-fiction community. In the world of art, there has been little or no such speculation/prediction...

What kind of art will be made in the future? Drawn always into new areas of glorious torment, what will artists be showing in th next decade? What new artforms will we be seeing at the imminent turning of the 21st Century?

JEREMY WELSH
A Hypertalk

Fireside Stories is a virtual performance. Starting from a quote by Laurie Anderson: "technology today is the campfire around which we tell our stories", this short presentation leads at the changing relationships between technology and culture. The text draws upon historical and contemporary sources – from Benjamin to Virilio - and personal anecdotes or observations. Fireside Stories is a performance disembodied – only my image on screen appears before you.

GREG GARVEY
God and Silicon: Better Eternal Living Through Technology

Father Interactive of the Order of the Binary Brothers, just recently unmasked by the tabloids as the founder of the Cult of the Fibonacci Series and former lead singer for MYLAR, the seventies *fin de decade*, nowave group with such forgettable hits as "Self-surgery, "Micro-wave atrocities, (Put your poodle in the micro-wave!)" "Meltdown" takes to the podium to deliver not the old, not the new but the generation neXt Testament – Eternal Investment strategies brought to you by the Digital Religious and Electronics Corporation (DREC).

With missionary zeal Father Interactive will explain the marketing techniques that have made Automatic Confession Machine such an outstanding success in Europe and North America. With evangelical fervor Father Interactive will reveal the very strategies he used to match wits in Zurich with theologians, marketing czars and investment quants from the Vatican even taking on a representative of the Dominicans (the very order that ran the Inquisition). Leveraging to the max the proprietary neural net software developed for the Automatic Confession Machine, Father Interactive will unveil the Seven Sacrament Product line for point of purchase sales all providing the same patented convenience of the touch of the "AMEN" key.

Pay per confession is just the beginning of a vast new digital information service that offers both users (sinners) greater ease of use and religious service providers a competitive edge over the conventional brick and mortar religious service approach. Of special interest will be a discussion of new financial instruments such as the Mortal Sin Mutual Fund. Invest now, be saved or drop out!

HIGH&LOW
artists in cyberculture

Greg Garvey

TAKAHIKO IIMURA
AIUEO NN Six Features

A video installation using six monitors and 6 VHS tapes was first realized at Kirin Plaza Osaka, 1993, using 6 CRV videodiscs instead of tapes. This tape version allows random combination among six monitors.

Combining the comical and the absurd, I realized six funny faces, which were manipulated by System G (Real time texture mapping developed by Sony), to animate the visual images of six Japanese vowels in Japanese and Roman alphabet.

The concept is developed from Jacques Derrida's "Differance" in which the difference of "Image", "Letter" and "Voice" works in space and movement. Thus six images of "AIUEO NN" differ and delay with the letters and the voices, realizing an example of multiculturalism.
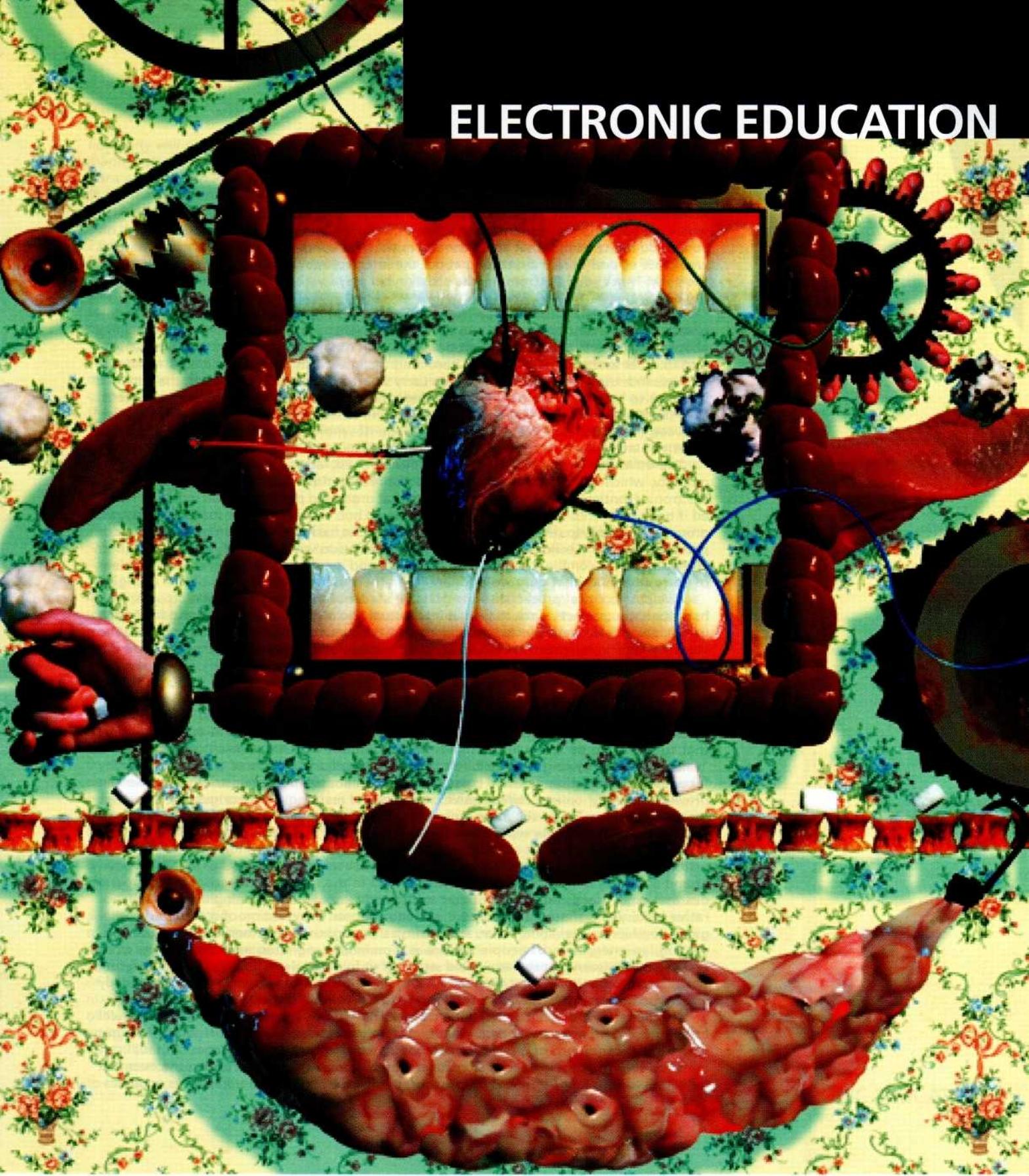
ROY ASCOTT
THE PLANETARY COLLEGIUM
Electronic Art and Education in the Post-Biological Era

Remember Vincent Van Gogh's *Painter on His Way to Work,* carrying it all on his back? That's where art education is heading. I don't mean the canvas and easel. I mean carrying it all on your back, in the clothes that you wear and in the headband in your hair. 50% pure natural wool 50% optical fibre. I am talking about the interface moving onto and, eventually, into the body. That's your electronic media artist on her way to school. She's wearing the university on her sleeve.

We're not talking about a few curriculum changes here. We're not talking about the gradual replacement of some of the library stacks with a few computers. We are talking about the total dissolution, disintegration, and dispersal of Higher Education. From real estate to cyber estate. The university is becoming the interversity. Ask the students. Hundreds of thousands use the Internet daily. When Larry Smart first issued NCSA Mosaic, the network interface to hypermedia browsing, there were ten thousand users in the first three weeks. Now there are over two million. Students are half in school and half in cyberspace. They live between the virtual and the real. They are in the Net more often than out of it. This is the advent of Inter Reality, the space we are most likely to inhabit for the next many years.

The ethics of the net, its integrity and inclusiveness, are creating a social behaviour, a morality, which will bring huge bonuses to the real world. I am with Esther Dyson of the Electronic Frontier Foundation when she says that organised political parties won't be needed if open networks "enable people to organise ad hoc, rather than get stuck in some rigid group". The end is to reverse-engineer government, to hack Politics down to its component parts and fix it. She echoes the words of Hazel Henderson writing twenty years before her: "Networks are a combination of invisible college and a modern version of the Committees of Correspondence that our revolutionary forefathers used as vehicles for political change".

This post-political process also involves the student in learning to browse, to graze, to hunt for ideas, projects, data, as well as intellectual and artistic collaboration and friendship in all kinds of electronic places, virtual libraries, telecommon rooms and cybercolleges. The students' time in telepresence and virtual learning mode is increasing rapidly. Have you noticed in the studios, libraries and computer suites how every terminal, every interface is occupied, all the time.

There are 50 billion adults in the world seeking education in one form or another. That form will be on-line. CD ROM is migrating to big disks at a server near you. The future of education lies in the function of integrated multimedia telecommunication services. But that future could be solely in the hands of big business who simply see "content" as the "value-added" they've got to include to get "market share". I foresee a completely crazy take-over of education by these commercial telecommunications industries unless we can provide models of on-line collaborative creativity and learning whose originality, effectiveness and appeal outshine the more cynical manipulations of the market. We cannot hope to do that in isolation, in our separate colleges, just meeting occasionally, even at conferences as dynamic as this.

I want to invoke the sense of a group in which each member has more or less equal power and authority in both access to knowledge and in the means of its reconfiguration and distribution; a group concerned with art and the advancement of learning through collaborative inquiry and shared experience. I want to propose the creation of a Planetary Collegium: non hierarchical , non-linear, and intrinsically interactive; a gathering together, a connecting, an integration of people and ideas. Combining cognition and connectivity, what better creative learning organism could serve our unfolding telematic culture. But by definition such an organism cannot be planned and implemented top down. In fact it is already emerging, bottom-up from the infinity of interactions within the net.

The Planetary Collegium is a paradigm of the 21st century Interversity. Its emergence will be chaotic, informal, even random. Chaos, or non-linearity has the effect that tiny changes in the initial conditions of a system create massive differences at later stages. This will certainly be so in the world wide web of telematic systems. No one can foresee the eventual outcomes of thousands of minds interacting so intimately all over the planet. As an educa-

tional organism, The Planetary Collegium will be the ultimate fuzzy system. As artists and educators, we can't afford to overlook fuzzy thinking, or the sciences of chaos and complexity. And in looking for other models of collaborative creativity, we should examine the Santa Fe Institute, for example, whose open-ended association of thinkers is bearing the fruit of integrated knowledge and visionary intimations of future states . Perhaps one of the more radical outcomes of such inter disciplinary collaboration is that which has led to the establishment of the field of artificial life. At its inception, Chris Langton succinctly characterised it:

> Only when we are able to view life-as-we-know-it in the larger context of life-as-it-could-be will we really understand the nature of the beast. Artificial Life (AL) is a relatively new field employing a synthetic approach to the study of life-as-it-could-be. It views life as a property of the organization of matter, rather than a property of the matter which is so organised. . .The "key" concept in AL is emergent behavior. Natural life emerges out of the organized interactions of a great number of nonliving molecules, with no global controller responsible for the behavior of every part. Rather, every part is a behavor itself, and life is the behavior that emerges from out of all the local interactions among individual behaviors. It is this bottom-up, local determination of behavior that AL employs in its primary methodological approach to the generation of lifelike behaviors".

Thi s bottom-up, distributed, local determination of behaviour and of meaning equally describes our art of connectivity and interactivity, mind-to-mind collaboration through computer-mediated tele-communications systems. An art in which the artist or author is a complex and often widely distributed system, in which both human and artificial cognition and perception (I call this "cyberception") play their part. An art which is emergent from a multiplicity of interactions in electronic space. The bottom up process of creation replacing the classical top down imposition of ideology or aesthetic.

There are five defining features of this process which differentiate it conspicuously from Western art of earlier eras: connectivity, immersion, interaction, transformation and emergence. Art in flux: unstable in structure, undecided in form, uncertain in outcome. Ours is the culture of transformation, an attribute not only of our advanced technologies but of our desire to construct our own identity and build our own reality. This is the irresistible appeal of virtual reality. But VR technology provides only a stage on which we can prepare for the real challenge of the 21st century: the construction of artificial life. The role of the artist in this process is essential. Without poetry, sensibility and intuition, the outcomes can only be at best of a utilitarian banality or of a monstrous futility. So the Planetary Collegium has much to prepare for. With these stakes ahead of us, the creative integration of science and technology with arts education becomes mandatory.

The entry of the academy into cyberspace need not be traumatic. Education at its best is always a matter of opening doors, discovering new perspectives, making the invisible visible, although the doors of cyberspace are much more likely to open onto the convoluted perspectives of an Escher world, than the solid linearity of a Poussin landscape. It's like cruising the Moebius strip rather than Sunset Boulevard. Chances are we'll need intelligent agents to guide us through the data parks to where we want to be. Artificial agents are already taking over many of the college tutors' functions.

Four new ways of being and doing, I would suggest, are arising within our telematic culture and will contribute to our conception of a planetary collegium:

Telenoia: computer-mediated, distributed mind-at-large: asynchronous global connectivity.

Not paranoia!

Cyber estate: the interfaces, networks, circuits and sensors of telematic educational structures.

Not real estate!

Inter Reality: fuzzy state between the virtual and the real in which our everyday social, cultural and educational interactions take place. IR is located between VR, a-Life and natural systems. Not phoney reality!

Cyberception: emergent human faculty of technologically-augmented perception /conception.

Not natural deception!

The interim question is how the university as we know it now, given the market pressures and the challenge of on-line services, is going to react. It could simply go "open university" and join the Interactive TV lobby, devolving ultimately to a set-top box, a TV operating

system, an on-line look and listen machine, video on demand with a few optional buttons. On the other hand, it could transmute into a planetary collegium such as I have proposed making accessible to all our children the world's finest minds and the most creative energies that it can retain within its electronic web.

It is not difficult to see that the traditional institutions could easily become ghettos of mandarin refinement without fundamental redescription and restructuring. What students need now is not so much intensity of instruction but ease of navigation in the knowledge fields. The bit stream is replacing the structured discourse. Being on-line to a critical community can be more rewarding than in line for frequently and brief face to face tutorials. The dissolution of the university as real estate will not occur overnight. University investment in cyber estate is only just beginning. But our plans as educationalists must be anticipatory. We need to show our administrators the way that culture is moving, and the speed with which it is getting there. What's more, we are educating our students for their life twenty years hence, not just for the day after graduation. The ground is shifting fast. To provide an example I have logged into Edupage as I write this text,:

> 06.21.94 Computer future is flat.
> The director of Xerox Palo Alto Research Centre's electronics and imaging lab, Malcolm Thompson, says that the lab has developed a flat panel screen which is a computer and which has the resolution of a piece of paper. . . . that will be the computer of the future. "

What will be the consequences for art and for education when the digital image is no longer box-dependant? When we no longer have to sit up and beg for information with a typewriter keyboard and TV set? When whole walls of building inside and out can be digitally flooded with sound, colour and light, images and texts flowing in endless transformations, when whole environments respond to our body movements and the articulations of our voices?. When the printed page no longer regiments our thinking into orderly rows of linear data? If the poets, artists and musicians of the world are not ready with strategies to effect this environmental and ecological digitalisation, the politicians, merchants and entrepreneurs will. In this context, Art schools have a clear necessity to put up or shut down.

But college is a place for social experiment as much as artistic and intellectual growth. Nothing is more human, warm and convivial than a bunch of kids hanging out on the Internet. As networked virtual reality transports our telepresence, and gives us the tools to reconfigure our own identities, social life will become not only more complex but more imaginative, the scenarios of conviviality outstripping no doubt those of the most fecund scriptwriters of the old movie era.

I am happy to admit to possessing a butterfly mind. I'm constantly on the move, physically and virtually, between nodes, between people, between data, between cities, between images, between channels, between texts. I have a psychic restlessness called connectivity. I blame the technology! But then, everyone blames the technology whilst everybody knows that technology has imposed nothing upon us that we did not first desire. Technology arises from our longing to be out-of-body, to see beneath the surface of things and events, to break the bounds of authorised perception, to exceed language, to transform the material world, to recreate ourselves. Technology represents a further embodiment of mind. Minds of course can be vacuous, coldly calculating and analytical, mean and narrow. The same is the case for technology. Minds also can be open, inclusive, loving, spiritual, transcendent. The hope for a cognitive technology lies in this , indeed the hope for a truly human electronic, multimedia and interactive art precisely lies here. The context of this embodiment, the ecology of mind, is at the root of all our considerations about art in the era of interactivity and transformation. With the bionic revelation of our cyborg nature now well rehearsed and understood, it is clear that our art is post-biological also. Again, the educational provision for the development of this post-biological culture must form the overarching agenda of a planetary collegium.

In between reading again Francisco Varela's *Embodied Mind* and Barbara Maria Stafford's *Body Criticism*, the two poles of radical constructivism and non-linguistic representation between which our electronic arts can be calibrated, I encountered a new text by David Gelernter. "The Muse in the Machine". Varela brings to our emergent, distributed telematic culture, the Buddhist concept of the non unified, decentralised self, and to our sense of self-

creation, the view that cognition has no ground beyond its history of embodiment, seeing the mind as an emergent and autonomous network rather than an information processing input-output device. "Structural coupling", mutuality between ourselves and environment, has important implications for the evolution of our "interactive art" , just as Stafford's "aesthetics of almost" usefully proffers a perceptual and affective model of knowing .

For me, Gelernter can be usefully triangulated with Varela and Stafford because of his project to build a spiritual computer. An emotional computer. Gelernter has valuable things to say about computers and creative thought. "A computer that can't feel can't think". His new book speaks our language. And from his vantage point at Yale, he "rejects the traditional academic subject divisions", and feels "especially at home in the no man's land between art and science". Professor Stafford must feel the same, I would guess, navigating between aesthetics and medicine to chart the emergent revolution in seeing and imaging. Equally, Francisco Varela is not fettered by academic boundaries and roams over an extensive cultural terrain, combining neuroscience with Buddhist theory, and speaking to issues in art as much as society.

From these three vantage points, a map of consciousness and the reality we actively construct can be defined. Such vantage points and the new perspectives they cast upon our understanding of ourselves, must become endemic of the learning landscape our Collegium will provide.

Not only are students redefining who they are and what they may become, but we too must redefine our identity as teachers, collaborators and guides relative to them. Similarly our tools are changing. While the printed book will continue to be employed, the question becomes how and for what purpose, since it is clear that hypermedia is in many areas set to replace it. The book has come to be the embodiment of authority and its obsolescence as a primary academic tool will cause considerable problems in the academic world. The book is a medium which is fixed and frozen while interactive media are fluid. Post-modernism with its relativist doctrine of layered realities and the slippage of codes has prepared us for the shifting uncertainties of authority, indeed of authorship and ownership of ideas whatever they might constitute, either in science or in art. But the scripting, negotiation and critical evaluation of a hypertext present demands for revolutionary pedagogical change .

It's not simply that many colleges are haunted by the ghosts of culture past but that apparitions of the future are emerging on every screen, from every disk, in every network. These apparitions are the constructions of distributed mind, the coming-into-being of new forms of human presence, half real, half virtual, new forms of social relationships, realised in telepresence set in cyberspace. They are challenging the old discarded forms of representation and hermeneutics which still haunt the lecture halls. The students are beginning to treat the university as an interface to Inter Reality as a doorway to a radical constructivism, the way into building their own world. What could be more hopeful than a world designed by the young tested against the on-line wisdom of a global community. This is education in its hyper-Socratic form.

There will be no easy transition from the past stability of tradition to the dynamic uncertainty of the immediate future. New priorities must be set in the fiscal affairs of universities. In academic networking and on-line research, change is imminent and difficult times are ahead. "As the Internet expands something will have to give: either the government will stop paying, or politicians will notice that the government is paying and will impose controls, like those imposed by school boards on textbook content or by the FCC on radio and TV broadcasts". The Clipper chip, the cryptography issue, poses serious problems for academic freedom. As Bruce Sterling recently reported from the Conference on Computers, Freedom and Privacy: when the audience was asked by a White House representative who they feared would abuse cryptography more, the US government or criminals, three quarters voted against the government.

The question remains. What is implicit in electronic art practice that could become explicitly creative in a post-biological pedagogy? How can we transform technological chance into a universe of values. Where art was once principally concerned with the behaviour of forms now it is concerned with forms of behaviour . The pedagogical adjustment that this calls for is radical, the rupture with old values is definitive. The aesthetic canons of classicism and modernism are completely redundant.

ELECTRONIC EDUCATION

We live in deeply cynical, distrusting and despairing times. Technology is universally blamed. But it is technology not despair that will enable us to feed the two thirds of the world who live in starvation. It is technology not cynicism which can enable the physically disadvantaged to hear, see, walk and communicate. It is technology not fear that will engineer solutions to the corruption of genetic codes and the scourge of disease. But that technology must be allied to creativity and spiritual awareness to fully accomplish these things. It is going to need all our combined skills to heal the rifts between art and science. It calls for nothing less than a planetary collegium to advance the art of electronic media and its related educational process.

I started by referring to Van Gogh's *The Painter on His Way to Work*. I should remind you that not only does it no longer exist, it has not done so in the lifetime of most of us here, having been destroyed by fire in World War Two. But its powerful virtual presence in print was enough to inspire Francis Bacon to a whole series of works. Watch out for its presence in Virtual Reality, it could become even more involving. You may find yourself in Van Gogh's shoes yet, carrying his painting into artificial life.

THE X TABLES
Dialogues with the Prosthetic Unconscious

Table: An arrangement of numbers, words, or items of any kind, in a definite and compact form, so as to exhibit some set of facts or relations in a distinctive and comprehensive way, for convenience of study, reference, or calculation.

Virtual Furniture

1.1   Richard Bolt (Senior Research Scientist in the Perceptual Computing Group at the Media Laboratory of MIT and author of The Human Interface) gave a presentation at Ohio State University, in a series on Technology and Postmodern Culture (fall, 1993), in which he argued that 'dealing with computers will become less like operating a device and more like conversing with another person.' Bolt demonstrated his point, as Susan Roth described it, by means of a computer program that responded to voice command, gesture (through feedback from a digital glove), and gaze (through feedback from an eye- tracking device). The display contained a chair and a table on which were placed a glass and a pitcher, on a floor covered with black and white tile.

Bolt's presentation provides a point of departure for a brainstorming session (or course) devoted to the invention of a method for an electronically supported education. We need to look closely at the two central elements of Bolt's performance: the interface metaphor ('like conversing with another person'); the demonstration of a virtual (computer-generated) table.

1.2   The virtual table brings to mind Plato's three beds (or tables), listed in order of reality from most to least real—the pure form (the idea of the table); the carpenter's table; the picture of a table made by an artist. Where does the virtual table come in this list? How should we understand the table Bolt displayed? The very insistence on the table—moving it, raising, rotating and lowering it before the fascinated gaze of the audience—evokes an allegorical effect. Our starting point is the meaning of this table—a hermeneutic question. We will not stop there, however, but move on into a heuristic relationship with the table, to learn not what it means, but what we can make of it.

Bolt's interface metaphor may be considered in the context of the history of dialogue, and this metaphor (communicating with a computer is like having a conversation with a person) is the key to our project. Let us accept as the terms of our design project the idea that the future of education in an electronic era depends upon our ability to extend and adapt the dialogue to computing. The first thing that a quick review of the tradition reveals, however, is the fact that the meanings of the terms are unstable and shift from epoch to epoch. Thus for example 'to converse with a person' means quite different things in an oral civilization and in a literate one. We have to assume that when the technology is electronic rather than print or speech (the different media imply different institutions contextualizing their employment) both the practice of conversing and the nature of personhood will be undergoing a transformation. Our task as interface designers, then, is to invent the prototype of an electronic dialogue.

1.3   Plato invented the dialogue. *When Plato wrote, dialogue was neither an already ancient literary tradition nor the simple transcription of natural conversation. Instead, dialogue was unprecedented and was inaugurated by Plato's hybrid of oral and written conventions, oral genres, and philosophical modes, a blend he termed dialegesthai, not just two but many voices 'crossing speakings' or speaking across one another, or 'spanning' or 'comprehending' each other's statements* (Swearingen, 49). The dialogue actually is part of a collection of interrelated inventions, all of which were designed to take advantage of the material features of alphabetic writing: dialogue, method, and school. Plato's Academy is considered to be the first school. Method was the practice and dialogue the genre or form in which this practice was expressed in school. The dialogue entitled Phaedrus is the first discourse on method in the Western world.

We may use Phaedrus as a model, a relay, as a point of departure for generating its equivalent for our new apparatus (with its emerging new configuration relating technology, institutional practices, and human subject formation). The dialogue was a hybrid—partly oral, partly written—intended as a new way to communicate in the new institution called school. What are the elements of the hybrid? From the old oral culture Plato retained the scene of a face-to-face exchange of two speakers; from the new written culture Plato accepted the abstracting procedures of analysis. When the two are fused in Phaedrus (and the other dialogues) the result is *dialectic*. The dialogue was a written drama (a narrative) showing speakers performing the dialectical method. In the Academy, students read the dialogues as a basis for further discussion. This discussion was not *conversation* in the form practiced in daily life, but the special way of talking adapted to the work of specialized knowledge. To converse in school, from Plato's day to our own, is as different from conversing in the home as conversing in the home is different from speaking in a ritual ceremony (such as in church). Oddly enough, this difference, like the technological basis of the practices of schooling, is often forgotten or ignored. To make use of the metaphor of conversing with another person for designing the human-computer interface, we have to remember that the inventors of modern literacy made use of the same metaphor for the human-book interface. Conversation as represented in the tradition of dialogue must be recognized as a response to the possibilities of a new apparatus, including the demand for new institutional practices and new individual behaviors related to the social assimilation of a new technology of language.

Plato's invention supplies an inventory of what we need: what are the equivalents of school, method (dialectic), and dialogue (genre, mode) in our circumstances? For starters, letUs focus on the parts of the hybrid. Literacy is for us what orality was for Plato. From our position at the close of the era of literacy and the opening of the electronic era, what parts of writing will we retain, and what parts of the electronic will we accept? And what will be the result of this fusion, unlike either one of its two component parts? We know what the functionality of this invention must be: method. We have to invent the practice of reading and writing capable of fostering learning in a computerized culture.

1.4   Between Plato's time and our own the dialogue underwent a complex evolution, marked by at least three distinct *moments. Plato's dialogue transcended earlier 'story,' that of epic and drama, with a protocol for conceptual interlocution that was designed to frustrate the technification of thought. Schleiermacher's translation of Plato's dialogues into German came to be the headwater of a massive reform . . . that emphasized natural voices, living speech, union between minds rather than understanding of texts, polyphony, deliberately unsystematic philosophizing in spoken and written dialogues. The modern hermeneutic tradition represented by Heidegger, Ricoeur, Gadamer, and Bakhtin has revived and extended the German romantic template to emphasize the irreducibly polyvocal, interlocutionary elements in all language* (Swearingen, 68). The essential shift from Plato to today is the result of the expansion of literacy. PlatoUs relation to text was pre-hermeneutic, as reflected in SocratesUs complaint in Phaedrus: *Writing, you know, Phaedrus, has this strange quality about it, which makes it really like painting: the painter's products stand before us quite as though they were alive; but if you question them, they maintain a solemn silence. So too with written words: you might think they spoke as though they made sense, but if you ask them anything about what they are saying, if you wish an explanation, they go on telling you the same thing, over and over forever* (Plato, 69).

Plato feared and warned against the danger of texts being misunderstood in the absence of the author (the text as orphan without its father/author to protect it). Although the methods of interpretation developed in the epoch of literacy proved that the same words could be made to say quite different things, hermeneutics was intended to preserve the presence of the father/author as a spirit accessible by means of the text. *Dialogue persists in evoking the quasi-religious because even when it is not being used in the hermeneutics of sacred texts it invokes the presence of the author* (Swearingen, 69). In other words, the face-to-face encounter of the partners in an oral culture that Plato's hybrid preserved in the written dialogue persisted throughout the entire history of the form, manifesting itself in our own moment as an ethical imperative.

The history of reading in fact may be understood as the exploration of the interface metaphor of conversing with another person. The prejudice against the text is reduced, of course, and the condition of having a relationship with a book is accepted. The Socratic question and answer is transferred to this relationship, as in Gadamer's treatment of the text as an answer to a question: *The reconstruction of the question to which the text is presumed to be the answer takes place itself within a process of questioning through which we seek the answer to the question that the text asks us* (Gadamer, quoted in Crowell, 345). Gadamer, that is, transferred *voice* to text in order *to construe the text as a partner in that dialogue constituted on the other side by the interpreter's (reader's) interrogative activity* (343). The ideality of the word and its relationship to truth are not affected by medium or institution in Gadamer's hermeneutics.

1.5   In our context, Plato's invention of the dialogue may be understood as the invention of an interface metaphor: writers relate to the written as if they were having a conversation with a person. This metaphor is enforced by means of an ethical imperative. *Why does Levinas insist on the irreducibility of the face-to-face? The answer lies in his conception of the face as 'expression': 'The face is a living presence; it is expression. . . . The face speaks. The manifestation of the face is already discourse'* (355). This insistence within the modern moment of dialogue on the oral metaphor of conversation reflects a conception of the human subject that, ironically, came into being as part of the apparatus of literacy. The concept and behaviors of *selfhood*, as grammatologists such as Eric Havelock have argued, are as much an invention as is the alphabet or school. An apparatus, that is, is a social machine. The ethical problem addressed by the face-to-face encounter is a feature of the separating or alienating of the person from the collective people, a unity that is replaced with a subject-object relationship to the world. The methods of abstraction and the experience of individuality both evolved as part of the matrix of literacy.

The ethical dilemma of the relationship between self and other (the problematic of the Other) has dominated and driven the evolution of hermeneutics. The hermeneutic procedure in the modern moment is *characterized by a structure of alienation and return, excursion and reunion or, in Bakhtinian terms, of identification and exotopy. As for Gadamer, in the homecoming of Bakhtin's prodigal Self, the Self becomes 'more' than it was before: after returning home from its long journey, the Self is more itself. . . . 'I' can now, upon return in my own unique 'placement' in existence, complete the Other, since I have the Other's vantage point and some extra features to which only I have access* (Daelemans and Maranho, 228).

Part of the difficulty of extending dialogue into the electronic apparatus has to do with the transformation of the apparatus as a whole: not only does the technology change, but so too do the understanding of the person and the behaviors creative of subject formation. Keeping in mind Thomas Kuhn's notion of paradigm shifts, and the incommensurability of the world views of different paradigms, we might suppose that the ethical dilemma of self/other will not be solved in an electronic apparatus, but simply that it will disappear (to be replaced by dilemmas peculiar to the new circumstances). These transformations do not happen by themselves, however, nor do they happen in any predetermined way. How might the process of interface design take into account the wisdom of the ethical imperative of the face-to-face conversation in dialogue without losing sight of the emerging conditions of a new apparatus?

Death Tables
L. tabula a flat board, a plank, a board to play on, a writing tablet, a written tablet, a writing, a list, an account, a painted tablet, a painting, a votive tablet, a flat piece of ground, prob. from same root as taberna TAVERN.

2.1   The story of Simonides, the inventor of mnemonics, is well known. As reported by Cicero in De oratore, Simonides left Scopas's banquet hall just before the roof collapsed, killing all those in attendance. *The corpses were so mangled that the relatives who came to take them away for burial were unable to identify them. But Simonides remembered the places at which they had been sitting at the table and was therefore able to indicate to the relatives*

which were their dead (Yates, 2). The effectiveness of his recall suggested the method of places and images that allowed rhetors to manage the information explosion created by writing, and to give long speeches from memory. '*He inferred that persons desiring to train this faculty (of memory) must select places and form mental images of things they wish to remember and store those images in the places, so that the order of the places will preserve the order of the things, and we shall employ the places and images respectively as a wax writing-tablet and the letters written on it*' (2).

Like Simonides, interface designers are in the position of having to invent a practice for the use of a new information technology, with the moment of invention being informed by a catastrophe, by a scene of massive death. Our interface design, that is, must work with the internet (electronic memory technology), which originated in the ARPAnet experiment to support military research: *in particular, research about how to build networks that could withstand partial outages (like bomb attacks) and still function. . . . In the ARPAnet model, communication always occurs between a source and a destination computer. The network itself is assumed to be unreliable; any portion of the network could disappear at any moment (pick your favorite catastrophe—these days backhoes cutting cables are more of a threat than bombs)* (Krol, 11).

The nuclear catastrophe the military researchers had in mind required that the invention of a memory system come prior to the collapse, rather than after it, as in the case of Simonides. Our new dialogue should take into account and assimilate within itself the anticipation of these conditions of communicating by means of a ruined interchange.

2.2   The metaphor for our invention process has already been provided by Thomas Erickson, who suggested the evolution of pidgin languages into creole as a model for the evolution of the Macintosh interface. *The characteristic ways that pidgins evolve into creoles may tell us what properties a linguistic system—or an interface—must have for it to become a powerful communicative device while remaining relatively simple and easy to learn* (Erickson, 13). Erickson does not push the metaphor very far, since the main point of his article is to invite others to use a system of analytically extrapolating from models for becoming more inventive about interface design. The creole model is introduced as an example of how the process might work. Even within the reduced terms of an example, however, the brilliance of Erickson's suggestion is clear. Pidgin begins as a language for doing business in the absence of a common language among different peoples, and begins to change into a creole (that is, into a powerful, full-featured language) in the speech of pidgin-speaking children, once the pidgin has become so common that it is spoken in the home (14).

Since it is not important for his immediate purpose, Erickson only mentions in passing that one of the conditions in which creole developed was *a result of the slave trade in the Caribbean, when slaves from the same areas were deliberately separated to reduce the possibility of uprising* (14). His method of examining the symmetries between two juxtaposed domains (in this case between creole and the Macintosh interface) reveals the fit between the destroyed and dispersed scenario of the internet design and the conditions of the slave trade that created most creole languages. The catastrophe in the latter case includes the notorious middle passage in which as many as ten million Africans were forcibly removed from their native lands and dispersed throughout the colonies, a passage which millions of individuals did not survive. A manifesto for creoleness refers to creolization as *the brutal interaction of culturally different populations: Generally resting upon a plantation economy, these populations are called to invent the new cultural designs allowing for a relative cohabitation between them. These designs are the result of a nonharmonious (and unfinished therefore nonreductionist) mix of linguistic, religious, cultural, culinary, architectural, medical, etc. practices of the different people in question* (Bernab et al, 92).

Erickson limits his explicit exploration of the creole interface metaphor to the linguistic dimension (proposing the Mac interface might evolve a greater complexity of syntax, tense, and vocabulary). We will want to extend this analogy to include Bernab's et al broader understanding of creole as a cultural discourse. Meanwhile, the mnemonic scene supporting and guiding our initiative portrays the possibilities of surviving the greatest imaginable destruction—of the internet continuing to function after a nuclear strike; of African culture continuing to function after the diaspora. The creole manifesto makes a good case, moreover, for adopting creole as a model for communication in the electronic apparatus: *A new*

humanity will gradually emerge which will have the same characteristics as our Creole humanity: all the complexity of Creoleness. The son or daughter of a German and a Haitian, born and living in Peking, will be torn between several languages, several histories, caught in the torrential ambiguity of a mosaic identity. To present creative depth, one must perceive that identity in all its complexity. He or she will be in the situation of a Creole (112).

2.3   The relevance of creole to dialogue has to do with what Bernab et al describe as the fundamental orality of creole (Bernab, 95). The setting of Phaedrus—Socrates and Phaedrus hold their conversation on the banks of the river Ilissos—is one that would immediately evoke in. *And precisely because castration is somewhere between two surfaces, it does not submit to this transmutation without carrying along its share of appurtenance, without folding in a certain manner and projecting the entire corporeal surface of sexuality over the metaphysical surface of thought. The phantasm's formula is this: from the sexual pair to thought via castration* (218). The electronic dialogue must take into account this force of displacement and to recognize that the face-to-face has always been a metonym for the interaction of whole bodies. We should keep in mind too that the theory of castration is an account of the mourning process by means of which persons deal with all forms of loss, beginning with the separation from the mother's body. The dead addressed in psychoanalytic dialogue are those figures of the superego, all the authority figures with whom one identifies, internalized to become agencies of unconscious thought. The story of the superego relates how selves (the subjects of literacy) stay in touch with the wisdom of the ancestors.

Dressing Tables
Table (Palmistry): The quadrangular space between certain lines in the palm of the hand. Shirley, Love Tricks (1631): In this table Lies your story; 'tis no fable. Not a line within your hand But I easily understand.

4.1   One point of articulation between the two logics needed for an electronic dialogue is Alan Turing, whose personal story offers as much guidance for the software question as his professional work did for hardware design. Turing's biographer reports that in the conjectures attempting to make sense of Turing's suicide on June 7, 1954 (two years after his arrest and conviction for homosexuality) one of the most enigmatic pieces of the puzzle was the incident reported by Turing's (psycho)analyst, Dr. Greenbaum. In mid-May of 1954, Turing accompanied the Greenbaum family to an amusement park. On an impulse he went into the tent of a gypsy fortune teller to have his palm read. After half an hour he came out of the tent *white as a sheet*. Refusing to speak to the family, Turing went home. It was their last contact with him (Hodges, 496).

This incident may be read as an episode in the history of method, understood as a continuous evolution of the attempt to master fortune (or chance) by means of system. Turing himself resisted the turn away from system taken by his colleague Wittgenstein (Turing sat in on Wittgenstein's lectures on mathematics), but his fate now may be read as an example of the X formula Deleuze borrowed from Nietzsche: *we must reach a secret point where the anecdote of life and the aphorism of thought amount to one and the same thing. It is like sense which, on one of its sides, is attributed to states of life and, on the other, inheres in propositions of thought* (Deleuze 128).

This dialogical secret point in Turing's case is the famous imitation game he proposed as a way to test whether or not a machine could be considered *Intelligent*. The game is a kind of dialogue. 'First he described a parlor game of sorts, the imitation game, to be played by a man, a woman, and a judge. The man and woman are hidden from the judge's view but are able to communicate with the judge by teletype; the judge's task is to guess, after a period of questioning each contestant, which interlocutor is the man and which the woman. The man tries to convince the judge he is the woman, and the woman tries to convince the judge of the truth. . . . Now suppose, Turing said, we replace the man or woman with a computer and give the judge the task of determining which is the human being and which is the computerS (Daniel Dennett, in Kurzweil, 48).

In our context the imitation game may be recognized as a survival of the rituals leading to dialogue, such as those associated with the Eleusinian Mysteries. *Jane Ellen Harrison re-*

marked on the similarities between Plato's presentation of interlocutors as taking on views they did not agree with, or of being forced to say something they didn't mean, and the Eleusinian rites in which males dressed as females. Transformation and transcendence are effected through deliberate reversal. Harrison asserts that *Plato's whole scheme alike of education and philosophy is but an attempted rationalization of the primitive mysticism of initiation* (Swearingen, 65). The relevance of the Turing test to the new apparatus may be observed in the internet which is emerging as the institution that is to computing what school is to literacy. The experience of the unified self associated with the assimilation of literacy by civilization is being replaced by a new experience of a distributed identity forming in the online practices of MUDs and MOOs. Impersonation is becoming a motivating force of electronic subject formation.

4.2   What do these tables tell us? What information may we extract from them for solving our design problem? What pattern does their juxtaposition reveal? If our design problem is to cross the two logics of analysis and pattern to create a hybrid that will be to the electronic apparatus what dialectic was to literacy, it might be helpful to have a scene that condenses and holds the story of pattern as clearly in mind as the Turing test holds the story of analysis. Nietzsche's formula converging aphorism and anecdote tells us where to look for this story, if it is reduced to the term vita, whose anagram abbreviates the two intelligences (including their institutions, practices, and subject behaviors) converging in hypermedial internet: AI and TV. The figure that is to TV what Turing is to AI is Elvis Presley. *On September 9 [1956] Elvis Presley appeared live, from Los Angeles, on the Ed Sullivan show, performing four songs— 'DonUt Be Cruel,' 'Love Me Tender,' 'Ready Teddy,' and 'Hound Dog'—in the more familiar 'Elvis the Pelvis' style (to the delight of screaming fans in the studio). . . . CBS grew nervous over the then-current wave of Presley detractors and when the singer returned in January for his third and final Sullivan show, the cameramen were instructed to show Elvis only from the waist up. This truncating of Presley inflamed proponents of the new rock'n'roll craze who felt their hero was being unfairly treated* (Castleman and Podrazik, 112).

Elvis the Pelvis. This famous pelvis is the strange attractor that makes sense out of the face-to-face of electronic dialogue, and gives us an alternative term for our project: interpelvic design. The emphasis of psychoanalytic theory on the phallus marks it as a modern way of dealing with the same concerns addressed by the Mystery religions. The Eleusinian ceremony that Plato turned into a figure involved the display of a concrete thing as the sign of the fertility of nature. The implements and products of the grain harvest (the technology of agriculture) evoked the myth of Demeter and Persephone. The accessories of the Dionysian rites associated with the ceremonies (Dionysus raped Persephone according to the story) were carried in the ritual procession—the phallus and the mask—stored in the winnowing baskets related to those Plato used as a metaphor for chora, the space of generation, in his cosmological dialogue, Timaeus. *It is very likely that in the cista mystica [big basket], among the plants that can be seen on representations of the basket, one or more phalluses were hidden* (Kernyi, 66). To be admitted to the site of final vision, the initiates performed a rite meant to be kept secret, of *taking things out of the big basket and putting them in the little basket,* and then back into the big basket (66).

This game of *find the phallus* coincides with the history of dialogue at the point of the imitation game, which includes now the phenomenon of Elvis impersonators. In trying to learn how to write and reason with hypermedia we have to bring back together the abstract with the concrete seeing separated by the history of dialectic in literacy. Elvis impersonation, revealed in our context as a kind of pidgin, suggests that television in particular, and the entertainment media in general, are among other things the site of an emerging pidgin discourse capable of creolization when merged with computing. What is the grammar of this new discourse? Its prototype may be witnessed in examples of cultural creole noted by Thompson. The transfer to the Americas of the cult of Osanyin, for example, god of herbalistic medicine in Yoruba culture, included a crossing of the African myth with ready-made materials found in the American setting. An important part of the imagery of the cult is *the equation of bird with head as the seat of power and personal destiny* (Thompson, 45). The sacred metaphor portrayed an *iron bird set upon a single disk of iron surmounting several bells of iron. By 1954 creole transformations had already occurred. The new forms had ab-*

sorbed Western industrial or cultural fragments—the hubcap of an automobile, a metal rooster from a weathervane or discarded garden furniture, store-bought jingle bells— and invested them with new meaning. The rooster replaced the flattened birds of the elders, the hubcap sometimes became the base, and the jingle bells recalled the agogo gongs (48).

The detachability and removitation of parts are shared by creole and impersonation. Marjorie Garber has made sense of Elvis impersonation within the general history of transvestitism, with cross- dressing marking the X of dialogue. *It is almost as if the word 'impersonator,' in contemporary popular culture, can be modified either by 'female' or by 'Elvis.' Why is 'Elvis,' like 'woman,' that which can be impersonated? From the beginning Elvis is produced and exhibited as parts of a body—detachable (and imitable) parts that have an uncanny life and movement of their own, seemingly independent of their 'owner': the curling lip, the pompadour, the hips, the pelvis* (Garber, 372). The cults formed by fans around certain stars—the likes of Jimmy Dean, Marilyn Monroe, and in general the finite but ever-growing collection of celebrity icons—echo the scene Plato figured in Phaedrus, whose setting was the site of an Eleusinian ritual. The best linguistics available to account for fan discourse is based on the psychoanalytic theory of fetishism. The detachable parts that allow the anecdotal life of an historical person such as Elvis to become an aphorism of thought in a language are organized by the logic of fetishism. The detachability that permits transvestism—the deployment of wigs, false breasts, or codpieces—also allows creolization: the switch that turns a hubcap's reflection of the sun into a flash of spirit. In impersonation we have the figure that could well be to electronic dialogue what dialectic was to Phaedrus.

In the Elvis story the detachable part is not only explicitly and repeatedly described as an artificial phallus but also as a trick, a stage device, and a sham (Garber 367). In one of his early performances, Garber relates, Elvis stuffed his pants with the cardboard tube from a roll of toilet paper—an act that we now recognize as writing in pop- pidgin. The logic of the fetish (the doubleness that both sees and does not see the mother's absent phallus) operates by dreamwork, pattern formation, displacement and condensation. The interchangeability of face and pelvis in psychoanalytic theory makes clear what is involved in the electrification of dialogue as a face-to-face encounter. *By a familiar mechanism of displacement (upward or downward), which is in fact the logic behind Freud's reading of the Medusa, 'face' and 'penis' become symbolic alternatives for one another* (247).

The nickname *Pelvis* (replacing *phallus*) suggests how to generalize the sex and gender of this displaced face. By means of dream reason Elvis as icon can perform the work of the unconscious, that is, deal with those anxiety-producing parts of identity formation unthinkable within the subjectivation of selfhood. All the crossings of the borders constitutive of order and defended by taboos—hence denied to the conscious self—are performed by the Greek chorus of pop icons, thus carrying the liminal function of dialogue into entertainment discourse. *I need to argue for an unconscious of transvestism, for transvestism as a language that can be read, and double-read, like a dream, a fantasy, or a slip of the tongue. . . . And that this quality of crossing—which is fundamentally related to other kinds of boundary-crossing in their performances—can be more powerful and seductive than explicit 'female impersonation'* (354).

How to creolize the pidgin of pop icons operating in television pidgin? One likely answer lies in the development of interface agents, automated browse and search devices personified with the stereotyped gestures and attributes of cult celebrities. The same link (gram) that makes Elvis available for impersonation also makes him available as an information hieroglyph. The mythological functioning of Elvis in the present information industry may be fused with an analytical functioning by means of a prosthetic unconscious. Our project is to invent this picto-ideo-phonographic writing that makes Elvis (et al) impersonation a way to conduct problem-solving, critical thinking, creative innovation, and all the other language practices important to education.

4.3   Garber makes a case for considering the transvestite effect as marking the entry point of the Symbolic order (Lacan's term for that part of the unconscious representing the operations of social institutions). The transvestite, she states, is a good metaphor for writing as such (150). If Garber provides us with a case study, Deleuze supplies us with the grammar of the emerging electronic creole. The doubleness or fuzziness of the fetish structure (a feature of the logic of sense, or of the unconscious dream work) forms the same link between

pattern and software that the truth table formed between analysis and hardware. If the truth table made logic compatible with the electric switch, the fetish does the same thing for ordinary language. *Each of these words,* Deleuze writes, citing Michel Butor, *can act as a switch, and we can move from one to another by means of many passages; hence the idea of a book which does not simply narrate one story, but a whole ocean of stories* (Deleuze 47). The electronic analogy is extended to pattern in the operation of a paradoxical word as a switch. This compatibility across electricity, logic, and language is not surprising in itself since Russell, inspired apparently by Lewis Carroll's Alice books (featured also in The Logic of Sense), started the work that led to the Turing machine by sorting out the operations of paradox. Rather than trying to reduce paradox to logic, however, Deleuze pushes paradox to its extreme, treating it as an irreducible logic (or rather dialogic) in its own right.

Deleuze's logic of sense, then, is the postmodern version of the X of dialogical cross-speaking. *What are the characteristics of this paradoxical entity? It circulates without end in both series and, for this reason, assures their communication. It is a two-sided entity, equally present in the signifying and the signified series. It is the mirror. Thus, it is at once word and thing, name and object, sense and denotatum, expression and designation, etc. It guarantees, therefore, the convergence of the two series which it traverses, but precisely on the condition that it makes them endlessly diverge. It has the property of being always displaced in relation to itself* (Deleuze 40). In electronic dialogue two semantic domains are juxtaposed, two orders of information are set in motion as two series that is the equivalent in pattern of the step-by-step linear sequence of proof in analysis. The composer's task is to find the entity that produces the X effect: *Word = X in a series, but at the same time, thing= X in another series; perhaps it is necessary to add to the Aion yet a third aspect, action = X, insofar as the series resonate and communicate and form a 'tangled tale'* (67).

Such is the tale of the X tables, with table as the switch—the puncept, the word-thing—that allows at least a glimpse here of a discourse that crosses pattern and analysis. But this glimpse is still only the myesis, the lesser mystery of the sort celebrated by the river Ilissos, setting of Phaedrus. The my in the verb myeo and myo (which imply secrecy) relates these tables to the program of teletheory (Ulmer). *The self-evident first object of this verb is the subject itself: he closes himself after the manner of a flower. But a second object is also possible, which must be very close to the subject, his very own possession. Such an object is the secret* related to the German terms Geheimnis, heimlich, and Heim (home) (Ker nyi, 46); and, we should add, to the unheimlich, the uncanny effect of the fetish. The my root evokes the heuretic genre of mystory, useful for the beginning of the discovery process, but not yet the epopteia, the greater and more hidden mysteries that took place at Eleusis. The latter vision is the one to be undertaken collectively, by the design community—a project of interpelvic design for an electronic dialogue.

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RICHARD KRIESCHE
Time-and-Information -Based Environment

In the 'time-and-information-based environment' content and form, the central focus in art are becoming less and less significant. This doesn't just affect the traditional visual arts, but has a fundamental impact on our culture as whole, its cultural institutions, especially the art-schools, art and design schools, academies, Hochschule der Künste, etc. are challenged to become aware of their very own transition. But as recent examples already have shown, the answer to 'post-modernisation' isn't just the foundation of 'medialabs', but lies in the question of their cultural integration.

It is the question to strengthening culture as a whole, the fundaments of our traditions, the moral value systems, ethics, etc. for the sake to cope with the inevitable overall transformation. In defining this cultural realm art schools could function as a 'social lab' for the 'information-based society'. From this it follows its new social significance by interacting between the conventional methods of 'materializing' a world – as for instance done with painting and an electronic, technological, dematerialisational approach. This dialectics affects the center of the art schools in being part of the fundamental historical knowledge and the extreme innovative experiment in communicating between these areas of preservation and ceation. In this respect at least four aspects define the owned qualities of an art school in an 'information-based environment':

1. The aspect of continuity. The deliberate acceptance of the art school's traditions, and of its specific quality as an artistic, cultural and aesthetic institution in research, teaching and education.

2. The aspect of transformation. Scrutinizing the artistic traditions as to their sustainability as a basis for the imagery of our day-to-day techno-reality.

3. The aspect of social change. The confrontation of a technically dominated and technologically dramatically changing every-day reality with the traditional values and standards to which the art school continues to feel comitted.

4. The aspect of transparency. Opening the art school to extra-mural science, disciplines and research, integrating the art school with the technical, technological, informational environment to enable it for fullfilling its social responsibility: to process its aesthetic and creative qualities within the community.

JOSEPH DELAPPE
A Critical Teaching Strategy for the Digital Arts

Students are learning to be artists in a time of radical transformation of the systems utilized for the creation of art. The emergence of digital technology is viewed by many to be heralding an age of flexible interdisciplinary utilizations of new tools which will seriously affect the relationship between artists and their media. University Art Departments are faced with the difficult task of integrating emerging technologies into their curriculum in order to prepare the artists of tomorrow with the knowledge and ability to utilize modern technology effectively in their art practice. The integration of art and technology courses within the University often raises problematic issues. These include the concerted lack of attention given to technology related issues and practices in Art Foundation and History courses. Students entering introductory courses in Computer Art of-

ten lack any understanding of the context of the development of technology as related to the arts. Introductory computer courses generally focus on teaching large amounts of technical information necessary to utilize new tools. Unfortunately, this approach often creates students which are technically adept, yet conceptually and historically deficient. The author will detail a teaching philosophy which attempts to remedy this situation by creating an educational environment for the exploration of digital electronic systems through a balance of a strong critical, historical and cultural analysis and the development of technical skills through controlled experimentation. Functioning from a strong belief that it is only through informed and meaningful experimentation will the artists of tomorrow be empowered with the abilities necessary to avoid the creation of technologically masterful exercises which are meaningless as works of art. It is imperative to challenge students to move beyond the superficial utilization and understanding of technology to create art that forgoes fantasy in order to critically engage our reality. This is in part accomplished by challenging students to consider the larger cultural and historical implications of the technologization of art.

PAUL BROWN

Hype, Hope and Cyberspace - or - Paradigms Lost - pedagogical problems at the digital frontier

Several critical issues and problem areas have evolved over the past 20 years as computers have been introduced into the art and design curriculum. Issues of concern include:

* tools usage and skill > fundamental knowledge automation of traditional tasks > new opportunities creative potential > productivity enhancement pressures from the job front conservative attitudes in academia and industry role of tradition > new opportunities

* the InterNet and beyond the global library the global studio – distance collaboration peer contact and inter-institutional opportunities ownership of the net

* changing role for members offaculty the "computer expert" > integrated teaching professional development opportunities

* needs of fine arts > applied arts computer painting > a new medium the virtual studio

* expanding role of research opportunities for doctoral and post doctoral studies in the area

* redefinition of the discipline paradigm shift content > hype increasing credibility from other disciplines

* the place of art and design within broader academic institutions cross-disciplinary opportunities – potentials and pitfalls visualization – illustration rediscovered - or - cheap decoration? communication and information design

* the place of art within society political implications censorship technology and cultural imperialism

* the increased need for visual literacy in a hypermediated, telecommunications-based economy opportunities for service teaching primary and secondary education home schooling and edu-tainment – the private sector.

ANNETTE WEINTRAUB,
CYNTHIA BETH RUBIN,
SIMON PENNY, PAUL BROWN,
HORIT-HERMAN PELED, TESSA ELLIOT
Running to Stay in Place: Faculty Burnout in the Electronic Arts Proposed Guidelines for Faculty in Computer-based Media in Art and Design

Cynthia Beth Rubin & Annette Weintraub:

The computer age has brought many changes in how we think about images, construct images, and share them with audiences. It has even brought into question how we relate fine arts to other disciplines, including the other more established visual arts. What remains largely unexamined, however, is the role of the artist/professor in the academic world.

Most academic institutions appear to have assumed that although the basic tool of computer based art may be very different from that of other media, the teaching of it is not. They assumed that faculty could easily slip into the same structures that have long been established for the teaching of studio art. Requirements governing teaching loads and class preparation, and allocations for technical support services and budgetary allotments have not be reexamined. The assumption that computer art is just like other media is even applied to research, which includes exhibition and the demands of keeping current. While it may be logical for administrators to think of the computer-based arts as just another medium, for those of us in the field, the traditional structures just do not fit. This has led to a large discrepancy in the responsibilities of and expectations for faculty in this area as compared with colleagues in other studio art areas.

Anecdotal evidence from computer media faculty from a wide range of higher education institutions indicates that they are burning out under the pressure to perform at unrealistic levels. Tasks that appear to be the same on paper are simply more demanding for the computer-based artist, ranging from the ordering of supplies to the maintenance of studio facilities. As in any rapidly changing discipline, the work load of simply keeping current is enormous, and frequently no provision is made for professional development. This disparity in the demands made upon computer media faculty and their studio arts colleagues grows ever wider as the technology continues to evolve and is incorporated in more aspects of art and design curricula.

Frequently, colleagues and administrators outside of the electronic arts are unaware of many of these critical issues, and, as a result individual faculty in this area are often isolated and have little support. This panel presents a document which describes the problems and offers guidelines for the administrative and financial support which are necessary to sustain programs using computer technology and provides information about faculty working in this area that could be used in making evaluations in hiring, promotion and tenure. Topics addressed in this paper include: Descriptions of Typical Responsibilities Program Concerns: Curriculum Design; Keeping Current; Evaluation of Research/Exhibitions. Program Management Concerns: Administration; Budget; Program Promotion. Program Support Concerns: The Lab; Student/Faculty Relationship; Health Hazards; Other Support Issues. Recommendations.

This panel will open a larger dialogue with our international colleagues on these issues and formulate strategies for support of faculty in the areas of technology acquisition, performance evaluation, and the recognition of new venues for electronic arts. The guidelines document developed out of conversations between the moderators, who called a meeting at SIGGRAPH 93 in Anaheim under the auspices of the SIGGRAPH Education Committee. Attended by about fifteen individuals representing electronic arts faculties in the USA and internationally, the meeting addressed the document outline prepared by Annette Weintraub, and resulted in an Internet listserv group moderated by Cynthia Beth Rubin. Over the following nine months, the document was developed on the listserv, with significant participation from Dave Poindexter. The final document, which incorporated comments and discussion from the listserv was written by Cynthia Beth Rubin and Annette Weintraub. It is being distributed for endorsements, and is being presented to ISEA as well as to SIGGRAPH and the College Art Association of America(CAA).

Simon Penny

Electronic media arts in university and college contexts face new and demanding environmental conditions, both within and outside the college context. The most significant of these from a teaching and administration point of view is the rapid change of the technology. This is due to the fact that the rate of change and direction of change of the technology is controlled not by artists or the art community, but by the need for continued profits by the computer industry. This induces a false, technologically determined criteria on art works and art pedagogy.

This results in heavy pressures upon faculty to continually retrain, and the spectre of students being trained on hardware and software that will be obsolete by the time they graduate. It also puts a financial strain that many schools cannot bear. Funding often occurs in large one time lump sum grants for hardware with no infrastructure, technical support or ongoing upgrade and maintenance

budgets. This results in under utilised hardware which becomes obsolete before it has been well used. It is necessary therefore, that teachers and administrators establish a well thought out and sustainable plan for development of teaching programs in this field.

Horit-Herman Peled
This paper will focus on that aspect of center/periphery relations which concerns the status of the electronic artist/professor in the educational system.

Many will claim that the second industrial revolution, the computer revolution, has abolished the distinction between center and periphery in the art field. And, indeed, the marriage between communications and computers has produced tools that may allow us to carve a new shape for the art field. In my paper I will seek to sketch the contours of this endeavor and point out where educational institutions and electronic artist\professors active in them may provide a crucial foundation for this reshaping of the art field. I will focus the importance of developing a theoretical framework and critical concepts for the electronic arts. Such a conceptual framework will serve as a guding apparatus for the art field, in order to make it accept electronic arts as an eq ual but different art form, and not merely as a rather creative work produced by computers.

The existence of this panel attests to the conceptual collapse of the center\periphery perspective by raising identical problems for different geographical and cultural locations. Still, I will consider my geographical location as periphery. In Israel ther e are NO art (as opposed to art history) departments in Universities; there are only art schools. Only one of those art schools grants the BFA degree and there are no MFA programs. However, the art field is thriving, and there are many indications that th is anomaly in the educational system may soon change.

The tension between the educational institutions and the few teachers of electronic art do exist in Israel. Since here we are at the beginning of the development of electronic art as a legitimate component of art education, however, it seems to me that we can draw on the experience of the center and present programs that will take into consideration the lessons learned in the center. In presenting this as an international panel, I think we can empower ourselves in our profession and present the educational systems with our unique and different role as artists/educators.

Paul Brown: An Unbearable Load - Teaching New Technology in Art & Design
Since ISEA 93 in Minneapolis a group of art educators have been participating in a private InterNet conference called F-Burnout. The conference addressed the problems associated with teaching new technology in art and design education. Due to other commitments during this period my contribution to this dialogue has been minimal. However I have "listened in" with interest and am pleased that a series of recommendations have been formulated to address these problems. Elsewhere I have aired my own concerns on a number of occasions (references below). In particular:

* Subject specialists should accept responsibility for teaching new technology within their own area. Sculptors should teach sculpture, interior designers should teach interior design and so on. It is unreasonable to expect a small number of "art and technology specialists" to accept responsibility for acquainting students from many areas with high-technology processes and tools. This implies that ALL teachers of art and design have to accept responsibility for teaching their students about technological developments within their field of specialization.

* Specialists in new technology in the arts should be placed in positions where they can maximize their contribution to their academic community. Employing them to run basic introductory computer courses is a waste of their talents and of a valuable (and possibly essential) resource.

* The acceptance of new paradigms of art & design and art & design production are a necessary prerequisite for the development of adequate opportunities for work in the area. If the establishment believe that new technology is about using user-friendly application packages to make "traditional" art objects then opportunities for change are unlikely to exist.

Tessa Elliot: Act of Faith – Postgraduate Research in Computing in Art and Design at the Centre for Electronic Arts at Middlesex University
The position of an activity that is generally seen as neither art, nor science, is a tenuous one, particularly if the outcomes are unpredictable and open ended. Specific pedagogical issues emerge from a course that promotes an algorithmic approach to computing in art and design. The current educational strategies have arisen, over the years, out of acts of faith in - the potential of the discipline; the ability of students to disseminate and integrate their expertise; the support of the administration. The implications of this situation will be discussed with refrence to current work, the history of the department and future developments.
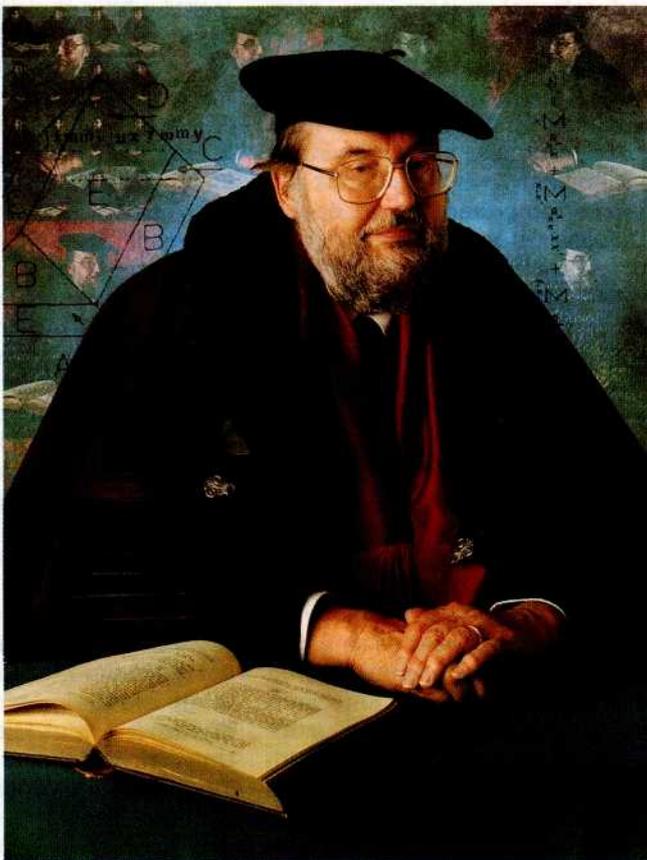
Yrjö Tuunanen, Henrik Duncer, Philip Dean

Susanna Koskinen

PHILIP DEAN
Media Lab UIAH

The formation of the Media Lab at the University of Art & Design Helsinki was a logical step in our University's evolution. Like any faculty bearing the name 'Media Lab' there is a certain amount of irony in adopting that title. But having witnessed the changes brought about by the use of computers in many of our departments in the last decade it was clear that there must be a place within UIAH where the problematics and advantages of digital media could be investigated, unrestricted by allegiance to any existing professional doctrine.

Drawing on our successes of recent years we set to plan the department which would not only play home to its own Masters degree programme but would be the driving force behind the successful integration of new digital tools into the university as a whole. In a time of economic depression there was a need to consolidate existing resources, both human and technical, and to strive towards wider allegiance with both other universities and industrial partners. The Finnish climate of education is rapidly changing and no better seen than in UIAH during the last decade. We have gained openness through internationalization and through this have begun to learn the meaning of the phrase, 'the competitive world of higher education'. Our education has become more relevant to the needs of modern society and academic values have had to be reassessed in the light of industrial dependence and sponsorship.

The Media Lab has many roles to play. It is a place for teaching, research and production of what we now term 'New Media', but more specifically we hope that the Media Lab will be successful in applying the traditional skills of our university towards developing that media and the interface of man and machine. Much technology has come to us as the spin-off of an official desire to attack or defend, whatever the cost. It is not surprising that the nature of this technology is somewhat hostile. Now that the silicon chip and the Internet fall within our more peaceful budgets we would be wise to seek peaceful uses for our new tools which will ultimately increase our understanding of each other.

MARIKKI HAKOLA:
HELSINKI MEDIASCAPE - A Journey to a Media Landscape

HELSINKI MEDIASCAPE is an arts and media project in three parts: live tv-broadcast show, documentary project and interactive CD-Rom project. HELSINKI MEDIASCAPE studies the language, esthetics and contents of electronic and media environment. HELSINKI MEDIAS-CAPE will be realizied by 40 professionals on media and 70 finnish art students of Theatre Academy, University of Art and Design Helsinki, Sibelius-Academy, Academy of Fine Arts, Helsinki University of Technology and Radio- and Television-Institute of the Finnish Broadcasting Company (YLE). The patron of HELSINKI MEDIASCAPE is the Director General of Finnish Broadcasting Company, mr. Arne Wessberg.

HELSINKI MEDIASCAPE is a large collaboration on media art and media culture between KROMA Productions Ltd, the Finnish art academies and main national tv-channel TV 1. Project will be completed and produced within a centre of media arts, The Magnusborg Studios where the high quality production facilities will be provided by the companies of the centre. The production company in charge, KROMA Productions Ltd. is spesialiized in media arts and cultural programs.

Project in three parts
The first part of the project will be released in Helsinki 22nd - 25th August 1994 during the 5th International Symposium on Electronic Art - ISEA '94. The live tv- show will be tv-broadcasted from the Cultural House STOA in 24th August 1994 at 7 - 8.30 pm. It is an interactive tv-experiment containing six different works. Blue Box is a electronic staging where the performers can be set into the environments by trick images made on video and computer techniques. The tv-broadcast presents a telematic concert and an interactive dance performance during which the audience can vote and changes into the choreography via tele voting.

The second part completes the 52 minutes tv-documentary "Mediascape". It will present the work process, realisation and the back grounds of the project. The art students portrays their concept of the world and ideas about media culture. Documentary collects also the high lights of the live tv- broadcast. The material will be collected during the work process in the summer 1994.

The third part completes an interactive CD-Rom documentary. The contents will be a collection of the mediaworks, interactive applications of the parts of the live tv-broadcast show and information about the works and authors.

From idea to realisation
The production team of HELSINKI MEDIASCAPE consists of several producers of audiovisual culture and media arts. Besides of the artistic activity they are also known of their long experience as teachers in art academies and institutions. In fact, the basic idea of completing HELSINKI MEDIASCAPE was brought up in discussions about art education. The discussions launched a wish to create collaboration in the field of media art in interaction with the arts and between the academies. Because of its nature, media art education calls for an act which crosses the boundaries of conventional forms of arts and education.

Art studens joined HELSINKI MEDIASCAPE with enthusiasm. The Finnish Broadcasting Company YLE TV 1 joined right after and showed an interest towards this experimental project. The final scale of the realisation was created when Telecom Finland Ltd made the descission to provide the telecommunication network system. A similar media project has never been carried out before in the Nordic countries. HELSINKI MEDIASCAPE will get an international forum within the ISEA '94 conference.

Selection of the works and towards the final completion
The idea to complete the HELSINKI MEDIASCAPE works was based on various ideas and propositions made by the students. The selection criteria were based on the variety of applications of contents and esthetics. The concept of media culture presented by the works of art students is not homogeneous nor it doesn't represent the today's media flood. On the contrary - the propositions represented the variety - and even an opposite picture of the world and ideas about the language and communication. The young artist generation owns a critical ability to read the audiovisual language and courage enough to create a new media expression.

Carrying out HELSINKI MEDIASCAPE as a three part project is a challenge for students and the production team. The working groups have had interesting discussions about the future, esthetics and forms of art and media culture. The audiovisual language and dramaturgy will inevitably undergo a great change because of alteration from the unidirectional mass communication, linear story into the intercative communication. I am glad to state that the students have accepted the challenge without prejudice and with courage. All the six works have their own theme which as an entity presents fairly well the general content of the propositions.

The works
INTERFACE is a 'media theatre', analyzing today's information environment in the spirit of Jean Baudrillard. The video staging is scratch - grated audiovisuality. Fragments of images are picked from ordinary tv programmes (news, sports, documentaries, The Bold and the Beautiful-simulation). The work studies the act of watching tv and the onthology of viewer and the object. It makes a statement about tv's internal logic and criticizes the unidimensional world picture of the mass culture. Where goes the board between the fact and the fiction?

PARADOX goes into the history of image, observation and interpretation of the visible. It compares the images of the classic art history with the painting act of children. The authors build tension between the scientific analysis and subjective observation. In the words of Dziga Vertov: "I am an eye. A mechanical eye. I, the machine will show you the world as I can see it...My way leads to creation of the fresh observation of the world. So this is how I explain you the unknown world in a new way."

EMMENTHAL SOCAPEX is a telematic concert performed by the performance group with the same name. It uses sources of synthetic sounds but also selfmade

instrumets. The work creates three different and interactive music events. Performance debates the sound reality of the natural environment, mechanic and electronic environment. The group calls for the audience to become more sensitive to listen and observe in a versatile way. Emmenthal Socapex don' t fear to use the newest technology nor the primitive instruments or sound sources which are not included as music instruments.

THE INSULT THAT MADE A MAN OUT OF MAC studies the dimmering boundaries between man and technology. The performance proceeds in a rythm of techno beat and creates a viewer a vision of cyber space which questions the sense of balance and the ability of outlining the space. The authors debates the development of man and technology. The development is inevitable and far beyond from the individual to control the process. The role of the machines as a part of the modern human existence is quite unconscious. So it is also quite impossible to abandon the machines.

"...THROUGH AN EMPTY SPACE" , the series of songs composed by Johan Tallgren is based on the poems of Göran Sonnevi. Music is performed by the soprano vocalist, the vibraphone and oboe. The metaphors of the lyric poetry were as the wells of the inspiration for the

themes of image: rooms, spaces, urban landscapes... The elements forms a serial entity presenting the landscape of the mind. The work studies the concept of the time and space and stresses the preseptible observation. Realisation is abstrac and leaves space into the sensual lyrics and the association of the viewer / explorer.

MEDEIA is an interactive dance work. TV audience tele votes three times for the continuition of the story and representation. The choice will be made in one go between two different scences.So there will be many recreations of the choreography. The performance is based on the classic myth of Medeia - the barbar queen who killed her children because of her husband remarried a younger wife. The issue is approached in every scene from a different view and with different representation. The structure debates the affect of the interactive narration into the dramaturgy.

There are three additional student groups in the project. These groups concentrate on the dramaturgy of the entity, documentary work and the design and lay out of the publications. ESCAPE produces the vignettes and the signs of the dramatised entity which will work as audiovisual guides. ONE MAN CAMERA UNITS makes a documentation of MEDIASCAPE realisations and gathers the thoughts behind the

project. FULL POWER LIFE designs the lay out of the publications.

This very moment, seventy art students and the production team are preparing towards the highlight of the project, live tv- broadcast from STOA. The work process has been outstanding and intensive experience for the group. We deeply thank all individuals, institutions, communities and companies for their support. It is time to welcome the audience to the journey to the media landscape.

ELECTRONIC EDUCATION

JUHA SAMOLA
AVEK and the support of audiovisual culture in Finland

The Promotion Center for Audiovisual Culture AVEK was founded in 1987. Its duty is to promote Finnish film, TV and video production and culture by redistributing the copyright income (the so-called blank tape levy) to artists' audiovisual productions.

The support program of AVEK is divided into three sections:
- to subsidize audiovisual production and distribution;
- to support the advanced studies of professionals working in the fields of film, TV, video and media art; and
- to support the audiovisual culture in general: to fund research, publications, festivals and other activities.

The major part of the annually allotted support, about 80%, has been directed to production and distribution. The sections of education and audiovisual culture have received about 10% each. During the season1993/94 the total amount of the support was FIM 14 million.

AVEK has a personnel of four with one part-time presenter of applications. AVEK works and is located in conjunction with the copyright organisation Kopiosto.

Production support
The founding of AVEK made the regular support of Finnish experimental production possible. Right from the start a strong emphasis was put on promoting those productions that have been left outside of the traditional art supporting institutions: short films, documentaries, media art and other experimental productions. Full length feature films aimed for theatrical distribution and music videos do not thus qualify for AVEK support.

With its production support directed to independent production companies AVEK aims to strenghten the production structure outside the TV companies. Along with independent Finnish companies, also international co-productions are being supported by AVEK.

The support can be allotted at different phases of production, starting from the preliminary research and script writing. At these stages the support is granted by a production councellor. Applications for production support are considered by the production councellor and a group of four specialists; the final decision must be confirmed by the board of AVEK. The support can also be granted afterwards both as a support for screening and for distribution. The support has to be specially applied for and it is granted after selection. It can be either direct support without obligation to pay it back, or loan without interest.

Support for the media arts
The support for media art is presented in AVEK by a special presenter,who works together with a group of three experts. The support is quite small in amount, approximately FIM 1 million. According to Tarja Koskinen, the executive director of AVEK, it is nevertheless of great importance: "The prospects for the future are altogether bright. There are, even internationally speaking, a few outstanding video artists in Finland, who's working conditions seem quite good. Yet the support offered by AVEK is not enough;

for instance the Finnish Broadcasting Company could take a much more decisive role in financing media art."

Instead of video art only, Koskinen wants to broaden the discussion to include other forms of media art. "The quite narrow field of video art is expanding rapidly. Artistically ambitious works that apply CD-ROM technology are already under way, and the possibilities offered by this technology seem limitless. At the moment artists in this field need to have international contacts with their colleagues. The International Symposium of Electronic Arts in Helsinki 1994 offers an excellent opportunity for this. In addition, the increasing number of co-productions in the the the field of media art offer possibilities to reinforce the resources of a small country."

Audiovisual support and the media arts
AVEK promotes media art not only by supporting production. Artists can also apply for personal grants for education and for attending to festivals. In the case of research and publications grants, the emphasis lies both on studies on the production structure and on new communication technologies and their impact on the whole field of art. In collaboration with other organisations, e.g. universities, AVEK also arranges further education for professional film, TV and video makers.

One of the audiovisual festivals promoted by AVEK festivals is the MuuMediaFestival, the only annually organised international media art festival in Finland. Having started as a video festival, MMF has broadened its focus to encompass the whole field of the electronic arts, including itself this year in ISEA'94.

DAVID TAFLER
The Empty Real Sphere and the Fall (from): Narrative in the New Moving Image

Many years ago, Andre Bazin wrote about the cinema as an invention in process. "If cinema in its cradle lacked all the attributes of the cinema to come, it was with reluctance and because its fairy guardians were unable to provide them however much they would have liked to."(Bazin, 1967:21) With today's electronic genesis, all those emergent computer-driven videoenvironments may indeed move the familiar cinematic narrative to a transcendent otherworld of lofty ideas. Or, as Seymour Chatman describes it in his volume STORY AND DISCOURSE (Chatman, 1978:30), "the indeterminacies – phenomenologists call them Unbestimmtheiten – that arise from the peculiar nature of the medium" may create a much more worrisome, albeit much more exciting medium of control. In a society where increasingly everyone directly or indirectly becomes wired to generic forms of the electronic cinema, from remotes and joysticks to power gloves and HMDs (Head Mounted Displays), to what extent does cinematic narrative reach into the psyche and become inseparable from other operating systems? My lecture will address those concerns. It will discuss how older narrative structures operate within newer interactive systems by focusing on spectator reception and on the effects of machine driven spectator position.

Most everything new in the cinema evolves from older paradigms. Brief historical windows open, however, that allow for paradigmatic change. Swallowed up by the waves of technological novelties and concomitant obsolescence, interpretation means evaluating the experience of an experience perpetually in process. To permit some grounding, it helps to begin with more traditional forms of movie going experience, an experience that, despite the changes, remains a part of contemporary culture.

Within traditional forms of cinematic narrative exposition, linkages suture the viewer with the characters through the portal of the screen. The characters operate as surrogate positions, clusters of traits for the exposition of events that constitute the experience of watching the film. Those characteristics that engage the spectator shape the intrigue and, in turn, the plot. The spectator remains riveted by the uncertainty of which traits will prevail in determining a character's subsequent behavior. Meanwhile the spectator, compelled by the desire to look, to know, to desire, identifies and projects. Becoming one with the writer behind the script, with the director behind the camera, the spectator reaches from within him or herself to shape a meaningful relationship with those characters, to anticipate and register positive and negative feelings triggered by the subsequent fulfillment or disappointment of his or her expectations of character behavior.

With the new narrative of the moving image spawned by computer games, video art, hypertext, programmed systems bring those narrative operations to the surface of the screen. A proportional transposition takes effect from an emphasis on reading to that of reacting. Substituting for the character(s) whose assigned traits motivate on-screen behavior, the spectator becomes a principal player. The program positions a participant spectator as a composite role for his or her own clusters of experience, that now come and go at an accelerated speed. Viewers enter into atemporal realms of direct address, encounter decisionmaking junctures marked by buttons, character icons, mise-en-scene grids, sets, polygons, and textual signs. On the surface, the spectator actively engages in the decisionmaking process rather than passively witnessing and antici-pating the behavior of surrogates. The spectator bonds with the programmer. The spectator enters into the text.

Once the spectator becomes part of the text, the critical distance for detaching and assessing the components of that text breaks down. Disrupted from stable narrative alignments, the spectator's point of view shifts about, reversing long term and short term tracks. Conditions that normally operate behind the scenes controlling the interplay between what Chatman calls "kernels" and "satellites," motivating the temporal discourse and setting up the plot, become switches and buttons allowing the viewer to guide him or herself through the text. The momentary play of each of these factors, individually or in groups, risks arresting the action and terminating the narrative.

Along the way, the spectator's experience both evolves as an interactive string of events while devolving as a linear string. While some vestige of causality remains, linearity fades as a driving force behind the narrative. All of the temporal constraints of an implanted (or designed) causality through which the narrative cinema directs attention metamorphoses into an array of individual response modes woven into an uncertain web, a web with multiple possibilities along pre-configured pathways. In constructing that weave, the writer now programmer must contend with the emotional material of the viewer-participant to assure that he or she fulfills certain vital tasks before he or she exhausts his or her interest, before the others: the viewer-participant's lover, children, friends, neighbors, and/or strangers, intrude on his or her non-theatrical ritual or environment.

Surfacing on the other side, the spectator's capacity for insight into the text depends upon the measure of his or her activity. That path may become very lonely. In some respects, the distance among viewer-participants increases as their common ground

shrinks. Whereas the traditional text manipulated an audience through the play of shared emotions that remain vicariously one step removed from the viewer through the assemblage of characters in the text, now, that emotional response becomes a part of the viewer-participant's own program. In short, the boundaries of the program embrace the cognitive operation of the viewer. Once the viewer becomes an engaged player, the viewer- player becomes a major narrative factor in the play of the text. Some operations may remain the same, others will change. The differences may be subtle but the consequences are not.

As part of my lecture, I will clarify the above by focusing on particular texts, by examining the role of the viewer-participant in light of certain progressive film texts, by analyzing the play of the narrative as it becomes embedded in the viewer-participant's new experience when the viewer becomes immersed in a non-linear, digitalworld.

ROBERT A. FISCHER
Audiovisual Literacy. On the Electronic "Caméra-stylo"

It is interesting to remember that the synchronous sound-camera (ECLAIR) was developed during the 1950's simultaneously with the magnetic recording-devices for electronic images (AMPEX). The world of (acoustically enhanced) moving images became a world of audiovisual communication – be it chemical-mechanical or pixel-based-electronic. Alexandre Astruc then coined the term "caméra-stylo" – the "fountainpen-camera" – for new possibilities of sound/image creativity.

The term will appear to be prophetic for the constitution of a new praxis in literacy: the development of audiovisual texts (as opposed to film-and/or video shows). In my paper, I will analyse the development of a new au-diovisual literacy against the background of western written codification of the word by means of the phonetic alphabet, within the dialectics of orality and literacy. I will show examples of recent film/video-texts in which the narrative structures are determined by the technology of codification.

Drawing back on my research as a cultural anthropologist on indigenous electronic media-praxis, I will also analyse some strategies of audiovisual textuality by so-called oral cultures (in particular by the Warlpiri Aborigines of Central Australia), who are making a transition from a form of "primitive audiovisuality" to electronic audiovisuality, shifting the period of alphabetical literacy. On the line we will understand that there is no such thing as an exclusively "oral culture". We will be able to acknowledge that some of the indigenous or non-european strategies, rooted in traditional narrative and representational forms, are presenting striking parallels with western avant-garde film and video-making, respectively audiovisual texts.

GRAHAME WEINBREN
An Interactive Cinema

As one who has been thinking about, experimenting with, and developing an interactive cinema for over 10 years, I am always trying to find ways to describe what is distinctive about the medium — a sound/image stream whose flow can be affected by a viewer. As one assesses the relationships of interactivity to traditional media, the first questions one asks are:

Does interactive cinema simply tell the same old stories in new ways? or,

Does it enable the disclosure of a different kind of story?

And this is the fundamental issue tackled in this lecture. For me the central issue in producing interactive works has been to achieve the right balance between continuity and interruption. Ideally, the interactive cinema should be seamless and continuous, a depiction of a complete world in which a narrative can unfold. On the other hand, to be truly interactive, it should respond to viewer input at any time, so that the viewer really feels that he or she is exploring the fictional universe. Can a work be at once seamless and continuously open to viewer input? Overcoming this apparent contradiction is difficult, but not impossible. Addressing the problem in the production of two works of interactive cinema, The Erl King and Sonata, I have developed a language of interactive montage, a grammar of interactivity.

Perhaps the ultimate question about works in the new technologies is: What is the point? Do we go to all this trouble only because it is the last available unexplored territory, the final untapped market? Are we climbers facing Mount Everest, or, worse, European colonials in Africa and Asia at the turn of the 19th century? Neither, I hope.

The potential of interactivity is apparent — to a limited extent – in advanced videogames, but the investigation has hardly begun. There are countless possibilities. We are finding that we can, indeed, say things that there was no way to say before, that we can depict experience afresh, that I can come closer to showing you what it is like to be inside my mind rather than yours. The last part of the lecture will focus on the question of what the interactive cinema allows us to say that could not previously be said.

ERKKI HUHTAMO
Phantom Train to Technopia

The *ride film* is a remarkable instance of the cyclical processes underneath the "progressing" surface of the moving image culture. Hailed as a major new audiovisual genre, it is actually one of the oldest. The early film audiences of the late 1890's enjoyed the impression of rushing straight into the screen world, as if carried by a "phantom" train. According to a contemporary observer, writing in 1897, the spectator of such a film "was not an outsider watching from safety the rush of the cars. He was a passenger on a phantom train ride that whirled him through space.."[1]

Phantom ride films, shot from the "cowcatcher" in front of the engine combined the experience of "virtual voyaging" (well known from stereoscopic photographs and panoramas) to the dizzying sensations provided by mechanical amusement parks attractions, such as the roller-coaster. The parallel between the development of early film culture and the amusement park "ride" went even further: in *Hale's Tours and Scenes of the World*, an extremely popular film-based attraction which debuted at the St. Louis Exposition in 1904, the "phantom train" was materialized as a stationary railway carriage, which was used as a theatre for projecting phantom ride films. Additional sensory stimulation – mechanically produced sound simulating the clacking of the railroad tracks, rocking of the carriage, even gusts of wind - was used to provide a total simulation of an actual train ride.[2] Actually, such a system had been patented much earlier in England by film pioneer Robert W. Paul, who wanted to build a multi-sensory simulator attraction based on H.G. Wells' novel *The Time Machine* (1894).[3] Even though Paul's time travel project never materialized, it can be considered as the conceptual prototype for all subsequent motion simulator attractions, long before Douglas Trumbull appeared on the stage.

The phantom ride film, now simply called *the ride film*, is currently undergoing a major revival coupled with the motion simulator, a speciality theater with hydraulically moving audience space. Pioneered by special effects master Douglas Trumbull in the 1970's and (re-)introduced in the context of the theme park in the 1980's, the motion simulator is currently entering the urban public space as a distinct attraction or as an essential part of new kind of entertainment centers, such as Iwerks Entertainment's *Cinetropolis*. It is even becoming "nomadic" in the form of the mobile simulation theatre, such as Rediffusion Simulation's *Venturer* and Iwerks' *Reactor*.

The ride film has become a growing industry. Major computer graphics and special effects companies, such as Trumbull's Ridefilm Corporation (now part of IMAX Corporation), Industrial Light and Magic, Boss Film Studios, Rhythm & Hues and Ex Machina have produced high quality rides. Some companies, such as Showscan Corporation and Iwerks Entertainment, have created a vertical product line designing, producing, marketing and exhibiting simulator-based attractions as their main business.

In a situation in which competition is getting more and more intensive the ride film is looking for new directions and already influencing other audiovisual genres, such as the music video. The first major "rock'n roll ride" was *Peter Gabriel's Mindblender* (1993), which has been shown in the United States in a *Reactor* motion simulator by the Pepsi Cola Company to promote their new product, Crystal Pepsi.[4] More rides-cum-music videos are on the way, as the Pet Shop Boys' recent "ride-clip" *Liberation* has already demonstrated. But the ride film can also be used for pedagogical purposes, turning boring statistic information into exciting, yet highly informative rides in data-space. An example of this can be experienced in the HDTV or Hi-Vision theatre in the lobby of Tokyo's new City Hall in Shinjuku. Just walk in and join the data-ride among visually stunning 3-D graphs and statistics!

The ride film has two "constant" esthetic features: the exclusive use of the first person point of view and the simulation of the experience of travelling in a vehicle – a train, a motorcar, a roller-coaster, an aeroplane, a space ship or perhaps a futuristic high-speed submarine. In actual attractions these features are supported by the synchronized movements of the motion platform and often with a "preshow" which may feature an illusionistic set, live actors-cum-guards and supporting film material. Unlike conventional narrative cinema, which is somewhat distanced, based on the narrative logic of alternating points of view (the spectator is "moved" between the "inside" and the "outside"), the simulator ride is constituted as a "total" attraction, aiming at providing an "immersive" make-believe experience. Artificially produced "ultra-realism" – a feeling of "actually being there" – is considered a major goal, thus reactivating one of the basic "topoi" – that of *"total immersion"* - underlying media culture.[5]

The emergence of the quest for "total immersion" seems to be connected with major ruptures in the system of audiovisual culture. The appearance of cinema around the turn of the century was such a moment, and so was the 1950's, when the coming of television forced the film industry to increase its attraction potential with features such as wide screen, 3-D and Technicolor. The basis of contemporary immersive "location based entertainment" (LBE) was laid at the same time with these developments, with the launching of Disneyland. 1980's and 1990's have seen the audiovisual landscape again in a period of turmoil and major re-structuring. The hegemony of

cinema has been contested by the music video, new forms of television and the whole spectre of computer-based interactive applications from arcade videogames to domestic media machines and new formats such as CD-ROM.

The simulator ride is clearly an attempt to synthesize these conflicting lines of development into a formula, which both sells and entertains, but offers also creative possibilities. It combines features from traditional cinema with state of the art digital technologies. Douglas Trumbull, whose most ambitious creation to date is the conglomeration of three rides labeled *The Secrets of the Luxor Pyramid* at the Luxor Hotel, Las Vegas (1993), thinks that the simulator ride should be a new, more involving genre of *narrative* cinema: "In this new form of entertainment, you'll feel like you are up on the stage with the characters and integrated into the story in a much more participatory way, so it's really a new dramatic art form. It's a new way to tell stories and it requires new technology to create a total immersion experience."[6]

Several recent rides have indeed been built around a narrative line, however rudimentary. Iwerks' *Robocop - the Ride* uses a well-know character from the big screen in an adventure which does not derive directly from any of the three *Robocop* films. More than any other, this ride reveals that the speciality cinema business, which was launched largely outside the main commercial film companies has started to flirt with Hollywood. People like Trumbull, and Iwerks' founders Stan Kinsey and Don Iwerks seem to be convinced that the traditional film culture has lost its energy and has to be reactivated by their offerings. The recent merger of two major speciality cinema companies, the Canadian IMAX Corporation and Trumbull's Ridefilm Corporation, is a sign of growing self-confidence and new kind of strategic think-

ing. Iwerks Entertainment acquired another speciality cinema company, Omni Films International, Inc, in 1994 and produced its major interactive attraction *Virtual Adventures* with the heavy-duty computer visualization company Evans & Sutherland. Other mergers and agreements will certainly follow. The structure of the audiovisual entertainment industry will look quite different five years from now on.

What will be the future of the ride film? Is it a passing fancy or a lasting phenomenon? The only thing that is certain is that a lot of creativity, hardware development and capital will be invested in it during the next few years (although some sceptical voices have already been raised about the real economic vistas of the present "experience industry")[7]. More and more rides will be made using synthetic computer imaging, emphasizing the trend to take the audience from "physical" reality for rides in virtual fantasy worlds. A central development will be the *interactive ride*, which has already been pioneered by NAMCO's 28 person [!] "spaceship" *Galaxian*, Sega's *AS-1*, Rediffusion Simulation's *Commander* and Iwerks Entertainment's *Virtual Adventures*.[8] The traditional passive ride experience is combined with features deriving from professional training simulators and video games. A case in point, in the first software for *Virtual Adventures*, "The Loch Ness Adventure", groups of six people are sent on an underwater mission. All the participants are assigned a specific task in operating the capsule, an "underwater vehicle". The success of the mission (to save Nessie's eggs) depends on the collaboration among the "crew" members (and competition between different capsules). Here is a new idea for *family* entertainment: no violence, an ecological theme, a far cry from a group of couch potatoes lying in front of the television screen.

The ride film is largely a corporate phenomenon. Beside Trumbull – a kind

of Griffith of the ride film - no names are known to the general audience. All rides are more or less collective creations, designed within the parameters of the commercial entertainment capitalism. We seem to have returned to the anonymity which reigned in the film culture during its first decades. Does this leave any space for an independent ride film culture to develop? Will there ever be an "artistic" ride genre, perhaps even a countercultural one? Do these questions make any sense in a media saturated world, where most creative talents seek their satisfaction in the corporate world anyway? And what about art: will there ever be classic rides, timeless museum masterpieces which will be experienced, maintained and restored five hundred years from now, like the Sixtine Chapel today? Or, does it really matter?

Notes

[1] The Phonoscope, August-September 1897, p.6 cit. Charles Musser: "The Travel Genre in 1903-04: Moving Toward Fictional Narrative", *Iris*, Vol.2, No 1 (1er semestre 1984), p.53. About the history of the ride film, see my "Encapsulated Bodies in Motion: Simulators and the Quest for Total Immersion", *Critical Issues in Electronic Media*, Edited by Simon Penny, New York: SUNY Press (forthcoming).

[2] Raymond Fielding: "Hale's Tours. Ultrarealism in the Pre-1910 Motion Picture", *Film Before Film*, edited by John L. Fell, Berkeley: University of California Press, 1983, pp. 116-130

[3] See Terry Ramsaye: *A Million and One Nights. A History of the Motion Picture Through 1925*, New York: Simon & Schuster, Inc., 1986 [orig. 1926] , p.155.

[4] See "Rock and Roll Meets Simulation", *Cinewerks Magazine*, Summer 1993, pp. 4-5.

[5] See my "Encapsulated Bodies in Motion: Simulators and the Quest for Total Immersion", op.cit.

[6] Ron Magid: "Brainstorming with Doug Trumbull", *American Cinematographer*, August 1992, p. 59-60.

[7] Michael Krantz: "Dollar a Minute", *Wired*, May 1994, p. 108, 140.

[8] About *Commander* and interactive simulators in general, see John Vince: "Commander: A Real-time Interactive Leisure Simulator", *Imagina 93 Proceedings*, Bry-sur-Marne: INA, 1993, pp. 189-198. See also my "Encapsulated Bodies in Motion", op.cit.

The Ride of your Life *or the Ride Film Phenomenon* **Curated by Erkki Huhtamo with Machiko Kusahara**

The program has been made possible by the collaboration of Angel Studios, Boss Film Studios, IMAX Corporation, Iwerks Entertainment, Links Corporation, Mega Productions, Rhythm & Hues, Ridefilm Corporation, Sega Enterprises Japan and Showscan Corporation.

Program credits
Total length: 87 minutes
1. Excerpt from Showscan promotional video (Showscan Corporation, 1993). An overview of the ridefilm phenomenon.
2. *Turbotour Colossus* (Iwerks Entertainment, 1990) The ride film in its most classic form, as a "raw" filmic reproduction of the roller-coaster ride.
3. *Devil's Mine Ride* (Showscan Corporation, 1992) A simulated roller-coaster ride inside an abandoned mine, created by the Belgium company Little Big One for the Showscan Dynamic Motion Simulator. Amazing computer graphics and a smooth transition between "physical" and virtual reality.
4. *Sub Oceanic Shuttle (S.O.S.)* (Iwerks Entertainment, 1991). Preshow and the Main Show. A entirely computer-generated futuristic ride on an high-speed underwater vehicle between San Francisco and Tokyo. A simulated earthquake will take place... Superb realization by the French CG company ExMacchina.
5. *The Funtastic World of Hanna-Barbera* (Universal Studios, 1993). A major cartoon ride realized by Rhythm & Hues for the Universal Studios theme park. A ride through the composite prehistoric-futuristic world of the Flintstones and the Jetsons.
6. *Megalopolice. Tokyo City Battle* (Sega Enterprises Japan, 1993). A futuristic crime adventure as a ride, produced for the interactive AS-1 simulator. A wild rush through Tokyo in the year 2154, in pursuit of a bunch of international ecoterrorists led by the arch-criminal Brute Bombalez.
7. *Robocop: the Ride* (Iwerks Entertainment, 1993). Preshow and Main Show. The figure of Robocop reappears in a ride adventure for Iwerks' Turbo Tour Theaters not directly based on any of the three Robocop feature films.
8. *Intergalactic Travel* (Links Corporation, 1991). A Japanese ride for a simulator called Conceptor at the Fujita Vente. "Travel through universe, sea, ruins, maze, and so on by a high-speed beagle, to a future city called Bio City". Composited from actuality films, miniatures, computer generated images and SFX.
9. *Space Race* (Showscan Corporation, 1992). The passengers of a spaceship embark on a journey to experience NASA's vision of space colonization in the future. The space ship is swept through a space vortex and ends up in a curious space demolition derby. A humorous computer generated ride by Industrial Light and Magic.
10. *Journey to Technopia* (Boss Film Studios, 1993). Preshow, Main Show and Main Ride. A major ride adventure directed by Kim Nelson and made for the Technopia Pavilion at the Taejon Expo in Korea, 1993. An utopian technosociety of the future is attacked by the dark forces of the Overlord. A curious combination of Asian mythology, techno romanticism and comic book -like adventures.

11. *Escape to Planet Earth* (Iwerks Entertainment, 1991). Preshow and main ride. Another space adventure with an elaborate preshow film. Shown at Iwerks Turbo Tour theatres.
12. *Intergalactic Interface* (Links Corporation, 1993). Another ride for the 8-seater Conceptor-simulator, which is open to the public at the Fujita head office in Tokyo. "You can experience the process of design production using a computer, through the medium of a designer's consciousness."
13. An excerpt presenting the Hi-Vision theatre in the hall of the Tokyo City Hall in Shinjuku. Ride as a way of presenting statistic information in the form of a trip through data space. From the material shot for the television series *The Empire of the Monitors*, directed by Erkki Huhtamo and produced by YLE (The Finnish Broadcasting Company), 1994.
14. *Virtual Adventures* (Iwerks Entertainment, 1993). A demo tape of the major interactive simulation attraction created by Iwerks Entertainment with Evans & Sutherland. Six people ride a "submersible" capsule, and each one is assigned a specific task. The first program is called *The Loch Ness Expedition*, the task being to save the eggs of the endangered Loch Ness monster.
15. *Dino Island* (Iwerks Entertainment, 1994). A sneak preview of a prehistoric ride developed by the French CG company ExMachina. To premiere in Iwerks Entertainment's Turbo Tour theatres in the summer 1994.
16. *The Secrets of the Luxor Pyramid* (Ridefilm Corporation/IMAX Ridefilm, 1993). An ABC television feature about the making of three major ride attractions for the Luxor Las Vegas hotel. They were opened in 1993 and created by Douglas Trumbull. Simultaneously a portrait about Trumbull's career as a pioneering ride film developer.
17. *Peter Gabriel's Mindblender* (Mega Productions/Angel Studios, 1993). The first "rock'n roll ride" based on Peter Gabriel's song *Kiss That Frog* and shown in Iwerks Entertainment's travelling *Reactor* simulators. Realized by Angel Studios and directed by Brett "Lawnmower Man" Leonard in a style deviating from the exclusive first-person point of view typical of ride films. Used by the Pepsi Cola Company to promote their new product, Crystal Pepsi.

Part II
18. *The Guardian* (Kia Motors/Rhythm&Hues,1993) A futuristic ride through the city of Seoul in the year 2050. Originally produced for the Kia Motors pavilion at the Tacjon Expo in Korea 1993.
19. *Seafari* (Rhythm & Hues,1994). An ambitious underwater ride produced for MCA Universal and to be shown at Matsushita's new theme park in Wakayama, Japan. A co-operation between the ride veterans, executive producer Sherry McKennan and director Mario Kamperg, the ride shows the current level sophistication that the genre has reached.
20. *Astro Canyon* (Talent Factory/Movida 1994) A brand new ride produced by Ben Stassen and realized by the Belgian computer graphics company Movida. Commissioned by the Japanese games manufacturer Taito, the ride will be used in Japanese game arcades in a two seated simulator, which will hurl the participants completely around, even upside down.

21. *Cosmic Pinball* (Talent Factory, Showscan/Club d'Investissement Media1994). A thrilling new ride animated by the Belgian duo that crated the successful Devil's Mine Ride, Jos Classen and Anton Roebben. *Cosmic Pinball* presents a wild pinball-inspired race criss-crossing a "Cosmic Park" floating in space. The film to be shown in the Showscan Dynamic public sources, The Euro Media Guarantee and the Media Investment Club.

PERTTU RASTAS
Foreword

The computer represents the same chameleon technology as video, although they have given names to two different forms of art (video art/ computer art). The definitions describe the art forms' contents as well as the technology used in them. Video art has its roots in experimental music, performance art, feminist theory of the image and the everyday use of video, as well as in the conventions of traditional cinema and television. The computer can be understood as a language as well as a form of technology. It is an universal media, encompassing the typewriter as well as the 3 D animations that aim towards perfect likeness with the reality.

From the artistic point of view, the universality of the computer can be seen as a dilemma that escapes our definition. "Computer art" can be anything that copies or replaces former visual technology. So far, the computer has not created its own independent reality that would fulfill Gene Youngblood's absolute definition of the computer art: "art that is not possible to create by other means." Computers are widely used in the audiovisual technology due to their excellent editing properties. They have become an essential part of the working process, yet in aesthetics we are still discussing other things: pictures, sounds, stories and collages.

The subcategories of computer art are in my opinion problematic, purely hierarchical classifications of the professional technology. Such a classification, consisting of ten subcategories, was presented at the IMAGINA festival. The subcategories simply refer to different ways of using the computer; they don't describe new forms of art. For the sake of art, according to Youngblood, we ought to look for something particular to computer art. In my understanding, such particular works have already been presented especially in the fields of Virtual Reality and A-Life. The third useful area provided by computers, telecommunication, is in fact television satellite technology.

Naturally, we can find typical (yet not unique) characteristics to describe the computer images. A central one of them is the "Techno-collage". Computers make the production, editing and copying of pictures such a quick routine that the mere routine process in itself can produce an aesthetic format. The artistic originality of the Techno-collage can be seen, for example, in the works of Beriou and Peter Callas. The genre reflects the ISEA'94 theme 'High&Low' – the easy experimentation possibilities provided by the computer have tempted many artists to create simple, yet interesting, "icon testaments" about their own life and ideology.

However, the most interesting area of computer art is a world still to be created. I call this world the "Real fiction." It is fascinating to observe the world of computer games from the point of view of the subconsciousness. Their images seem to be based on a dark, medieval subconsciousness, the mythological reality of knights, with the creatures of the underworld and the heavens romping freely around in our earthly symbol realism. Yet I'm waiting for us to completely liberate ourselves from the basically realistic world of images, and to move into the "real fiction" (Youngblood's "simulation"), into the mist of man's imagination that has no holds with this world. Culturally and historically, we are the product of this world's image realism, but let us prepare for the moon trips of imagination.
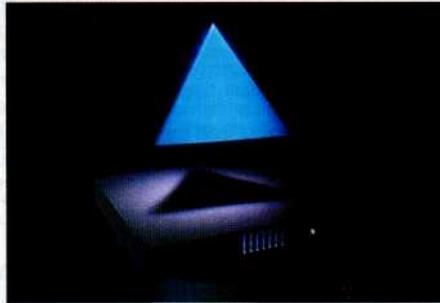

Otso Pakarinen

Leslie Wilson

Maurice Benayoun

Beriou

Ghislaine Gohard

Julie Myers

Julie Kuzminska

Tapio Takala

Michaela Zabranska, Sang Mah

Peter Callas

Sean Fitzgerald

DIGITAL NARRATIVES
electronic theatre

MAURICE BENAYOUN
The Quarxs

The Quarxs is a 3D computer animation film about strange entities disturbing our everyday life.

Z.A. Production/France, 20'33"

BERIOU
Tableau D'Amour

Tableau d'Amour opens on a grey desert-like landscape with an overlay of yellow grid line. The final tableau displays a rich design of organic matter and reveals a module of labyrinth like body structures. Between those two sequences, a love has unraveled, playing with our perception.

Agave S.A. CAP/France, 5'25"

SEAN FITZGERALD
The Arcana of the Primordial Numerological Flux

The Arcana of the Primordial Numerological Flux is a 3D computer animation, animated and rendered on a 33MHz 486 PC using Autodesc 3D Studio. The soundtrack was recorded and mixed on a Fostex X-15 Portastudio.

Duration 4'

TAPIO TAKALA & CO
Déja Vu

The video "Déja Vu" was produced at the Helsinki University of Technology in 1993-94 as a student project of a postgraduate computer graphics seminar discussing various animation techniques. The camera trajectories, as well as the motion of the objects (except the bats) are based on keyframe or procedural animation. A behavioral model, similar to that presented by Reynolds at Siggraph '87, was used to create the flock movements: an invisible leader boid is followed by visible ones whose flight paths are generated from simple, predefined rules.

Helsinki University of Technology, 3:28

PETER CALLAS
Ernst Will's Picture Book

"Bilderbuch für Ernst Will" is an electronic rendering of a form of proto-televisual iconomania: the creation of haphazardly sourced private pictorial scrap books or bilderbuch. Often intended for the surprise, delight and edification of grandchildren by grandparents, these books had the analogical potential to become flamboyant transmogrifications of the detritus and sequestered oddments of the great age of print in the later half of the 19th century.

The fortuitous collocation of views of towns, voyages of exploration, catastrophes, battle scenes and royal portraits become mantic in the deft hands of an expert sniper such as Hans Christian Andersen or the unknown creator of Ernst Will's picture book in war-time Vienna.

Duration 11'

MICHAELA ZABRANSKA
The First Political Speech

The First Political Speech is inspired by words, charismatic, hypnotic and humorous, but ultimately meaningless. The animation shows a crowd of technological "robotniks", entanced by a speaker seen only through the motion of its shadow. The robotniks, surrounded by hazy images of past, current and future world leaders from many cultures, respond with applause, as serfs to empty words. The words of inspiration used in the animation are from a poem of the same title written by canadian author, Eli Mandel.

Computer Graphics Research Lab./
Simon Fraser University, Canada, 2'20"

LESLIE WILSON
A Lithuanian Lullaby

A Lithuanian Lullaby is an old work (1988), but still almost a model of low tech video art and computer graphics. It's based on an old lullaby song and a naive singer/performance group plays the roles.

Duration 4:30

TROY INNOCENT / ELENA POPA
Nano in News SOS

As a nano you are born into a world of information which you must explore and find meaning within. You are an electronic lifeform on the other side of reality. A world of knowbots, icons, numbers and databases - your body has the EAT AN ICON system installed, allowing you to eat computer icons and assimilate information through your digestive tract. You know little of your origins or the reasons of your existence. So you venture through the world attempting to answer the question WHO IS IN CONTROL?

Duration 1'

JUDITH GODDARD
The Garden of Earthly Delights

This single monitor version of the installation of the same name commissioned for Video Positive 91 follows the Bosch painting in its tripartite form. It turns the 1990's into a surreal nightmare of monstrous creatures, urban horrors and visual overload. It uses both state-of-the-art computer animation and live action footage to take the viewer through a cityscape of imagination.

GHISLAINE GOHARD
Moksha – (Language is a virus)

A plunge into the infinity of an electronic feed-back simulating the influence of 'moksha-remedy', a psychedelic substance proposed by Aldous Huxley for the non-verbal education of adolescents. Question: Can images be a remedy to the language virus denounced by the writer William S.Burroughs? Note: The images of this video were created for the choreographic performance of "La porte Jaune ou le corps revelateur" by the French company Spid'eka, and projected onto the bodies of the dancers during the performance.

Duration 4'15"

JULIE MYERS
Trim to Fit

Body and fashion images have altered tremendously over the past forty years, changing in accordance to evolving perceptions of women's place in society. "Trim to Fit" is a light-hearted computer animation, using influential female icons of the decades to highlight the lengths women will go to in order to be "beautiful".

"Trim to Fit" was made using a Commodore Amiga computer, utilising Deluxe Paint IV, a graphics package which suited the spontaneous, colourful, 'cut-out' style of the work. The soundtrack, compiled by Dave Goulding, complemented the pictorial montage by using eclectic music samples from the 50's to present day.

The project was originally created as a site-specific piece, and is currently available for videowall installation.

JULIE KUZMINSKA
Chaos

A woman's choice of death by falling is transformed into a tumbling, fleeing, flickering succession of images and fragments of images. It is a psychological fall as well as a physical one, as the erotics of flight are intertwined with the approach of death and personal memories combine with sophisticated effects into a chaotic whole.

MILLA MOILANEN
Deep

A computer animation, which deals with the perception of visible reality, spectator interpretation and the reliability of the image. The work questions old frases like "I don't believe until I see it" or "I believe it because I saw it with my own eyes". Deep is a collage of images based on movement and the tension between them. The evolving story exists both in reality and fiction studying the limits of seeing through different processes.

Kroma Production/Finland, 5'.

LARRY CUBA
Retrospective Screening

This special program introduces the rarely seen, yet widely acclaimed computer animated films by the American artist Larry Cuba.

In his artwork Cuba is known for his painstaking strain after perfection. Because of this he has produced relatively few films which have, however, a quite unique esthetic quality. According to Gene Youngblood, "if there is a Bach of abstract animation it is Larry Cuba. Words like elegant, graceful, exhilarating spectacular works characterized by cascading designs, starling shifts of perspective and the ineffable beauty of precise, mathematic structure." (Video/Arts, Winter 1986)

The works
1. *3 / 78* (1978, 6:00, 16 mm. film, b/w, optical sounds)

Sixteen objects, each consisting of one hundred points of light, perform a series of precisely choreographed rhythmic transformations. Accompanied by the sound of Shakuhachi (the Japanese bamboo flute), the film is an exercise in the visual perception of motion and mathematical structure.

2. *Two Space* (1979, 8:00, 16 mm., b/w, optical sound)
Two-dimensional patterns, like the tile patterns of Islamic temples are generated by performing a set of symmetry operations (translations, rotations and reflections) upon a basic figure of tile. Two Space consists of twelve such patterns produced using each of nine different animating figures (12x9=108 total). Rendered in stark black and white, the patterns produce optical illusions of figure-ground reversal and afterimages of color. Gamelan music from the classical tradition of Java adds to the mesmerizing effect.

3. *Calculated Movements* (1985. 6:00, 16 mm, b/w, optical sound)
A choreographed sequence of graphing events constructed from simple elements repeated and combined in a hierarchical structure. The simplest is a linear ribbon-like figure, that appears, follows a path across the screen and then disappears. The next level up in the hierarchy is an animated geometric form composed of multiple copies of the ribbon figure shifted in time and space. At the third level, the copies are speared out into a two-dimensional symmetry pattern or shifted out of phase for a follow-the-leader type effect, or a combination of the two. The highest level is the sequential arrangement of these graphic events into a score that describes the composition from beginning to end.

DMITRI PRIGOV, MARAT GUELMAN
Yevgeni Onegin A Poetry Installation

A distinctive feature of the Russian
mentality is the preponderance to ask
impossible questions and to reach extremi-
ties in answering them (Dostoevsky,
Tolstoy). Is today's "computer art" really an
outcome of the intellectual properties of
the computer ? We think it is essentially a
human art and the computer is only a
means to an end. Yevgeni Onegin, a
collaboration of the Guelman Gallery and
poet Dmitri Prigov is an effort to create
real computer art: the work is a result of
the errors made by the computer. The right
of the computer to the creative act of fault
is being postulated. Accordingly, all the
other computer arts are declared pseudo-
computer arts.

Yoshiyuki Abe studied photographic engineering at Chiba University, Japan. After freelance activities in photography and film making, his computer graphics project, in both hardware and software, started in 1983. Exhibitions: ISEA'90,'92,'93, SIGGRAPH'91, ComputerKunst'92,'94 etc. Awards: Prix Ars Electronica'90,'91,'92, Eurographics'91.
> Prologue, Legend IV

AES Group (Tatjana Arzamasova, Lev Evzovich, Yevgeni Svjatskin) The artists got together as a group in 1987. Tatyana Arzamozova, born 1955. Graduated from Moscow Architecture Institute in 1978, worked on conceptual architecture. Got Grand Prize in competition "Theatre of the Future" by OISTT and UNESCO. Took part in exhibitions of conceptual architecture in London, Paris, Venice. (Tatjana Arzamasova, Lef Evzovich, Yevgeni Svjatskin)
> Work in progress

Roy Ascott Pioneer of telematic art, his seminal projects include "La Plissure du Texte" (Electra '83, Paris), "Planetary Network" (Venice Biennale 1986) and "Aspects of Gaia" (Ars Electronica 89, Linz).His work is widely published in English, French, German, Italian, Japanese, and Spanish. He is a consultant to many European institutions including the C.E.C., Ars Electronica Center, CETEC, Universite Paris Dauphine, the European League of Institutes of the Arts and editorial advisor to Leonardo (MIT Press), Intermedia (Madrid) and IDEA (Paris). He is Director of CAIIA - the Centre for Advanced Inquiry in the Interactive Arts at Gwent College of Higher Education in Wales.He was Professor fuer Kommunikationstheorie, Hochschule fuer angewandte Kunst in Vienna1985-92 and Dean, San Francisco Art Institute, California1975-78.
> Architecture of Cyberception
> The Planetary Collegium...

. asterisk point asterisk, see Artemis Moroni, Jose' Augusto Mannis, Paulo Gomide Cohn An abbreviation that in Computer Science stands for All Point All, or simply Everything, or Anything, adopted by a group of diverse profile people accomplishing specific parts in complex artistic and technological projects.
> The Electronic Carnival

Marina Baskakova Director of the Third Reality Center at Creat Inc. St. Petersburg.
> In Search for the Third Reality

Barbara Becker studied philosophy, sociology and history of arts, received her M.A. in sociology 1976 and her PhD in philosophy 1986. Since 1983 she is involved in research on philosophical problems of AI and cognitive science at the philosophy department of the university of Dortmund and at the GMD/St. Augustin. Her current interest concerns the role and impact of technology in art.
> Some Remarks on Problems...

Stephen Bell Born 1955. Currently Senior Lecturer in Computer Animation, National Centre for Computer Animation, Bournemouth University. 1991 PhD, "Participatory Art and Computers", Loughborough University. 1984-85 Artist in Residence, Computing Lab. University of Kent at Canterbury. 1977 First put pen and brush to computer plotter at Slade School of Art, London.
> Algorithms and the Artist

Maurice Benayoun (Z.A. Production) Maurice Benayoun (France,1957) teaches "Art Video and New Images" at the University of Paris. He has participated research projects about special effects and contributed new technology to audio-visual production and to the artist creativity within the Centre de Recherche et d'Etude sur le Cinema et les Arts Audiovisuel (CRECA) and the Centre de Recherche sur lImage (CRI).
> The Quarxs

Bériou (AGAVE S.A. CAP) Beriou? He was a mountain guy who used to live in a lost valley in the Alps. He spent apart of his life digging for gold in a mine. One day he realised that the seam he was working on was just a mixture of copper and iron - "fools gold". So, crafty as he was, he sold the mine to someone from the flatlands. But, careful as he is, he keeps on digging himself. Ever since then Beriou has been digging at the labyrinths of images and building rockpiles in order to find himself.
>Tableau D'Amour

Benoit Berry
>R-O-M (Read Only My Memory)

Peter Beyls (1950) has been exploring computer programming for artistic expression since the early Seventies. Beyls studies autonomy in graphic computer systems and develops computer-based musical instruments. He currently heads the Electronic Media Department at St Lukas Art Institute, Brussels.
> Algorithms and the Artist

Steve Binnion (UK) Editor/contributor to 'Queer with Class. The First Book of Homocult', political activist. Homocult's graphics and text combine queer theory with the anger and humour of punk.
> Saddling the Troyan Horse

Peter Callas (Aus, 1952). B.A.Honours, University of Sydney. Assistant film editor, sound editor, ABC Television, Sydney. 1980 Diploma in Art, Sydney College of the Arts. 1981-90 Lecturer for Video Art, City Art Institute, Sydney College of the Arts, NSW Institute of Techonology, Sydney; School of Art, University of Tasmania, Hobart. 1986 Video Artist in Residence, Marui Department Store, Tokyo.
> Ernst Will's Picture Book

Brian Evans is a music composer interested in the use of computer technology as an expressive tool in music and the visual arts. His current research includes exploration of mathematics as an artistic medium. Evans received his D.M.A. in Music Composition from the University of Illinois, USA and a M.F.A. degree from the California Institute of the Arts, USA. He works at Vanderbilt University, Nashville, Tennessee, USA, as a Research Artist and teacher.
> Algorithms and the Artist

Jean-Louis Boissier born 1945, is teaching arts at Université Paris 8. He has been a searcher, curator (Artifices in Saint-Denis, Revue virtuelle in the Centre Pompidou) and artist for many years, with aesthetic changes of arts and images in connection with interactivite and virtuality.
> Flora petrinsularis

Philippe Boissonnet was born in France (1957). After studying painting and drawing at the Fine-Arts School of Angers (France), he went to Montreal (Canada) with a graduate fellowship in 1981 and started to lecture in several universities from 1985. Presently professor at the University of Québec at Trois-Rivières, his drawings, holographic installations and copy art works have been shown in group and solo exhibitions in Canada, Europe, Australia, Japan and South America. He received production grants from the Canada Arts Council, the Quebec Ministry of Culture and the French Ministry of Culture.
> Awareness of Limits (Galileo)

Carsten Bredanger was born in 1970, studied philosophie, germanistics, computational linguistics and artificial intelligence at University of Cologne and Duisburg (both in Germany), Leuven (Belgium), musicology and composition in Essen and Duesseldorf (both in Germany). The list of works contains instrumental music, electro-acoustic music, multi-media and video, which are noticed internationally. Owner of the "Image Acoustique Studios", Duisburg.
> Expert Systems: Building a bridge to electronic sonic art

Peter Broadwell - BA/MA in Applied Math Univ. Calif. Santa Cruz 1978/1988 Peter has grown up all around the world. Interested in exposing people to the beauty of math he became involved in computer graphics about 20 years ago. Since that time he has worked at UCSC, Silicon Graphics and The 3DO

Company always blending the purely technical with the artistic. This blend has been meeting the public in the "Plasm:" series of interactive installation pieces since 1985. This series merges current mathematical research with state -of -the art computer graphics and an approachable aesthetic.
> Plasm: A Country Walk

Paul Brown is an artist who has been using computers for twenty years. In 1980 he was a co-founder of the UK's first computer animation company, Digital Pictures, and, in 1986 a founder of their National Centre for Computer Aided Art and Design. In 1988 he moved to Australia and, in 1990 helped establishing the Advanced Computer Graphics Centre in Melbourne. He has published numerous papers about art and technology and his artworks have been exhibited internationally. Since 1992 he has edited FineArt Forum, the art and technology network news service.
> Hype, Hope and CyberSpace...

Jorgen Callesen born 1966. Student at Aarhus University/Information & Media Science. Preparing a master thesis on the theory of Multimedia and experimental interactive fiction. Since 1991 collaborating with Stine Schou.
> Lailah

Tamara Cater is a dancer based on Dartmoor, the landscape of which is a primary source of inspiration in her work. She works as a solo artist and with companies such as Aspen and Global Heartichoke. She has previously worked at the Fylkingen Foundation in Stockholm, and is currently studying with Gabrielle Roth in America.
> Songlines

Lorne Christie was born in Scotland in 1969. He is a multidisciplinary design- er, and his animation for this project has formed part of his MsC in computer- aided Graphical Technology Applications at Teeside University. Previous employ ment and commissions have varied from engineering design to stencil restoration mural and signwork and prop construction. He also holds and honours degree in Industrial Design and Technology from Napier University of Edinburgh.
> Songlines

Cecelia Cmielewski is the Multicultural Project Officer at the Media Resource Centre, Adelaide, South Australia where she is involved in increasing participation of people from diverse cultural backgrounds in moving image culture. She is a designer who is involved in cross-art form practice.
> Narrative and Intervention

Michael Rosas Cobian born in Buenos Aires, Argentina in 1953. Studied and worked throughout the American continent and was involved in what is loosely termed "fusion music". In 1979, he moved to Europe. Since 1982 M. Rosas Cobian has devoted himself to composition full-time. Now he lives and works in London. His works are regularly performed and broadcast internationally, and he has been the recipient of prizes and awards. Besides orchestral, chamber and electroacoustic music, he has composed music for experimental films, dance and theatre, which stems from a deep held belief in multimedia, collaborative and inter-disciplinary projects.
> Urbis 4

Paulo Gomide Cohn graduated in Computer Science and Electronics from the Instituto Tecnol'ogico y de Estudios Superiores de Monterrey, Mexico and has a M.Sc. degree in Computer Science from University of Campinas. He is mostly interested in theoretical and compositional aspects of music. He is a member of the *.* Group since 1989.
>The Electronic Carnival

The Convolution Brothers is a new performing duo, started in 1993. Their first performance of their original work Gandy Bridge was featured in an event sponsored by JWAVE radio at the Session House - September 10th 1993, Tokyo Japan. The members of

the duo are described below. See Cort Lippe, Zack Settel.

> Gandy Bridge

Rebecca Cummins was born in Iowa, USA, 1957 and has resided in Sydney, Australia since 1986. She is a lecturer at Sydney College of the Arts, University of Sydney and has just completed a 6- month artist-in-residency in London through an Overseas Development Grant from the Visual Arts Crafts Board of the Australia Council.

> To Fall Standing

Peter d'Agostino is an artist who has been working in video and installation since 1971, and interactive hypermedia for over a decade. He is professor of communications in the Department of Radio-Television-Film, and co-director of the HyperMedia Laboratory, Temple University, Philadelphia. D'Agostino's work has been exhibited internationally in the form of installations, performances, telecommunications events, and broadcast productions.

> Cyberspace: Configurations of Space...

Karen D Davis
> Cine Play
> The Corporate Body

Derrick de Kerckhove Director of the McLuhan Centre at Toronto University; author of several books.
> A Volcanic Theory of Culture
> Ethics and Political Correctness

Joseph DeLappe Media Artist and Assistant Professor at the University of Nevada, Reno. He recently created a new facility and curriculum for the Digital Media Studio. DeLappe received his MFA Degree from the CADRE Institute of San Jose State University in 1990. His works have been featured in numerous exhibitions both in the United States and abroad. He is a recipient of a Southern Arts Federation National Endowment for the Arts Fellowship in Photography in 1993.
> A Critical Teaching Strategy...

Paul DeMarinis has been working as a multimedia electronic artist since 1971 and has created numerous performance works, sound and computer installations and interactive electronic inventions. He has taught computer, video and audio art and has been a video game designer . He has performed internationally. His interactive computer audio and graphics systems have been installed in art museums and science centers. Much of his recent work involves speech processed and synthesized by computer. A recent series of installation works, "The Edison Effect", uses optics and computers to make new sounds by scanning ancient phonograph records with lasers. He is currently artist-in-residence at Xerox PARC.
> The Edison Effect

Francis Dhomont has worked in electroacoustics from the very beginnings of this art. Five-time winner at the Bourges International Electroacoustic Music Competition (France) - where he was also awarded the "Magisterium prize" in 1988 - he has received the "Prix Ars electronica 92" and numerous international distinctions and awards. Since 1978, he has divided his time between France and Québec, where he teaches electroacoustic composition at the Université de Montréal.
>Espace/Escape

Lily Diaz (The University of Rochester/Ahead Energy Institute) is a multimedia specialist at the City University of New York, College of Staten Island. She has a B.A. in anthropology from Brandeis University and received an M.F.A. degree in computer art from School of Visual Arts. A Fulbright scholar and graduate of the Independent Study Program at the Whitney Museum of American Art, Ms. Diaz has lectured and shown her work in México, Puerto Rico, Spain and the United States.
>A Simultaneous View of History.

Digital Therapy Institute (DTI) Formed at the end of 1991 as a multidisciplinary group, with members from various fields including art, music, science,

engineering and therapy. Since then, DTI has been conducting research from diverse angle into the brain. The central members of DTI are Keisuke Oki (artist) and Henry Kuwahara (engineer and musician).
> Virtual Haze

Söke Dinkla born 1962 in Wilhelmshaven, Germany. Studied History of Art, Biology, Literature and Ethnology at the Universities of Bielefeld, Kiel and Hamburg. She works as an art critic and curator in the field of New Media and is writing a Ph.D. thesis on "Interactive Installations and Environments in the late 20th Century" at the University of Hamburg.
>The History of the Interface ...

Agostino DiScipio Born in1962, a composer with a particular interest in computer music research and theoretical work. He has worked at CSC (Univ.of Padova) and other places in Italy. In 1993 he was a visiting composer at Simon Fraser Univ. (Burnaby, BC), with a post-doctoral fellowship grant of the ICCS (Ottawa). He is now a main coordinator of Laboratorio Musica & Sonologia (L'Aquila) and a teacher at the Conservatory of Bari.
> Formal Processes of Timbre...

Charles Dodge (Conservatory of Music Brooklyn College/Center of Computer Music) received recognition early in his career for his orchestral and chamber music. He became one of the first composers to realize the vast potential of the computer for broadening the composer's palette. As early as in the late 1960's, he directed digital synthesis of sound, commuting back and forth between Princeton University, Columbia University and Bell Labs.
> Any Resemblance is Purely Coincidental

Chris Dodge Born in1969 in Maine, U.S.A. 1987 - 1991 B.A. New York University Film/Video, Computer Science, Music Composition 1991 - DSP Programmer/Consultant, Ariel Corporation 1993 - Artist in Resident, Insitut für Bildmedia, Zentrum für Kunst und Mediatechnologie, Karlsruhe Germany
> New Approaches of Image Processing...

Timothy Druckrey
> Networked Identity, Creativity...

Frances Dyson Dr. Frances Dyson is a practising media artist and theorist who specializes in sound. She has exhibited, lectured and published widely in Australia and overseas, most recently at the Kawasaki Museum in Tokyo for SoundCulture Japan, and the "Art and Virtual Environments" symposium at The Banff Centre for the Arts. Currently she is lecturing in Media Arts at the University of Wollongong.
> A Philosophonics of Space...

Gerhard Eckel received his diplomas in electronic music composition and in sound engineering 1986 and his PhD in musicology 1989. Since 1989 he is involved in research and development in the fields of computer aided composition and sound synthesis at IRCAM in Paris/France. His current interest lies in the questions concerning the use of technology in artistic creation in general.
>On the relationship of art and technology...

Sylvia Eckermann, Mathias Fuchs Sylvia Eckermann was born in Vienna 1962, studies of chemistry and history of arts, 1987-1990 member of the art cooperative Gangart. Mathias Fuchs was born in Erlangen 1956, studies of computer science (TU Vienna) and electronic music (Music Academy Vienna and EMS Stockholm). Since 1989 lecturer at the University of Applied Arts, Vienna. They have been working together in the field of multimedia and electronic arts since 1989.
>Link

Lev Evsovitch was born in 1957. Graduated from Moscow Architecture Institute in 1982, worked on conceptual architecture. Got prize in competition in Stockholm. Participant of the XVII Tiennale in Mialan 1989, exhibition "Paper architecture" in German Architecture Museum in Frankfurt-am-Main, "Paper architecture" in Paris in 1988.
>Work in Progress

Ken Feingold born 1952, has made many installation works, sculptures, videotapes and films, which have been exhibited inplaces such as the Museum of Modern Art, and the Whitney Museum (New York); Centre Georges Pompidou (Paris); Zentrum für Kunst und Medientechnologie (Karlsruhe), and Galerie Rene Coelho/MonteVideo (Amsterdam). His recent interactive works include "The Surprising Spiral" (1991), "Jimmy Charlie Jimmy" (1992), "Childhood/Hot & Cold Wars" (1993), and "OU" (1994). He lives in New York City.
> "where i can see my house from...

Maria Fernandez received her Ph.D. in Art History from Columbia University in 1993. She teaches art and social history of Latin America.
>Transcultural Approaches...

Sean Fitzgerald studied at Shrewsbury School of Art, then Film at Portsmouth Polytechnic. Lived and worked in London through the 1980's, making film, painting and writing. Studied computer imaging with Mike King and Richard Wright at London Guildhall University from 1991-93. Presently living in Fife and taking the course in Electronic Imaging at Duncan of Jordanstone College of Art in Dundee.
> The Arcana of the Primordial...

Monika Fleischmann, Wolfgang Strauss, Christian Bohn Fleischmann (1950) and Strauss (1951) studied working with computer scientist Christian-A. Bohn (1963), who does research on Scientific Visualization, Neural Networks and Virtual Reality. Topics of their collaborative work are the 'Design of Virtual Environments', 'Visual Communications', 'Human-Computer-Interfaces' and 'Interactive Displays'. The new forms of presence constitute the background of their research.
> The Dice Time of Dynamic Space ...

Rob La Frenais is a curator and writer, former editor of Perfomance Magazine and former director of the Edge Biennale, now writing about and curating art and technology projects including 'Earthwire', a project with artists using high technology in a rural setting and 'Connected 5' at the South Bank Centre, London.
> Non-explicable Phenomena...

Matthew Fuller (UK) editor of 'Unnatural, techno-theory for a contaminated culture' an important anthology of radical cyberculture. His previous book 'Flyposter Frenzy' looked at new political sub-cultures' appropriative use of quotidian technologies such as the photocopier.
> Saddling the Trojan Horse

Rebecca Fuson has drawn, painted, constructed collage, designed with type and pixels. A former modern dancer, her current interests involve the intersections of art and technology, communications and culture. In 1992 her work "Event Horizon" was awarded an honorable mention at Ars Electronica. She does not have a dog.
> Plasm: A Country Walk

Greg Garvey is an American living in Montreal. He is a Professor in the Department of Design Art at Concordia University in Montreal where he teaches computer graphics and multi-media. Previously he has taught at Endicott College, the New England School of Art and Design, Northeastern University, the Art Institute of Boston and the Massachusetts Institute of Technology where he was a Fellow at the Center for Advanced Visual Studies.
>God and Silicon...
>Pedagogy of the Oppressed...

Nikita Gashunin was born in 1956 in Moscow. Studied in Moscow Pedagogical Institute. Exhibitions since1977. Took part in group exhibitions and art fares in many countries in Europe, the USA and Japan. Solo exhibitions in Moscow in 1991and 1992, and in Chigaco in1994.
> Global Ambitions

Nicholas Gebhardt (University of Sydney) is a radio producer, writer and a musician who is currently

completing his Ph.D on jazz and modernity in the History Department, University of Sydney.
> Sounds Natural: Sonic Landscapes...
Carol Gigliotti, Ph. D. Assistant Professor, Department of Art Education, Education and Technology Liaison, Wexner Center for the Arts, Ohio State University.
> Pedagogy of the Oppressed...
Judith Goddard
>The Garden of Earthly Delights
Ghislaine Gohard was born in France in 1961. She graduated from the Montpellier School of Fine Arts (Ecole des Beaux-Arts de Montpellier) in 1984 and produced myriad art video tapes. Since 1983 she has broadcasted on French television (TF1, CANAL PLUS, FR3, LA SEPT, TV5) and cabled networks and shown at various festivals and exhibitions. She began working with computer graphics in 1987 creating video, computer generated graphics and computer animation for video installations and choreographic performances
> Moksha-Language is a Virus
Gomma X: (Italian) Editor of Decoeder Magazine, one of the many spines of the Decoder collective. Gomma combines being a consultant to the Italian parliament on electronic media with the outrageous activities of this cyberpunk collective.
>Saddling The Trojan Horse
Jane Goodall (The University of NewCastle/ Department of Drama) teaches drama at the University of Newcastle, NSW. She is the author of 'Artaud and the Gnostic Drama' (Oxford University Press, 1994) and is currently engaged in research on technology and cultural anxiety.
>High Anxieties
Beryl Graham is currently researching a Ph.D. concerning interactive art at the University of Sunderland, England. She is a visual arts curator and writer based in San Francisco and Newcastle, and has written widely, including chapters in the forthcoming Fractal Dreams (Lawrence and Wishart) and the Photographic Image in Digital Culture (Routledge).
> Choices: Gender Issues for Interactive Art
Volker Grassmuck was born in Hannover, Germany, in 1961. Went to school in Germany and the USA. Studied mostly sociology in Groningen (NL), Berlin and Tokyo. Worked as freelance journalist and editor for print and radio, desktop publisher, and computer consultant. Lives in Tokyo since 1989. Currently conducting dissertation research at the "Research Center for Advanced Science and Technology" of Tokyo University. Book publications: "Vom Animismus zur Animation. Anmerkungen zur künstlichen Intelligenz" (Junius Verlag 1988); translation: "Aleister Crowley: Tagebuch eines Drogenabhängigen" (a-verbal Verlag 1990); with Christian Unverzagt: "Das Mül-System. Eine Metarealistische Bestands-aufnahme" (Suhrkamp 1991).
> Into the Muddy Waters ...
Marat Guelman was born in 1960. Since 1990 he has been the director of "M. Guelman Gallery". He is Decan of Art Management Academy. Curated exhibitions, connected with "esthetics of participation": "Dedicated to the 7th congress of the People's Deputatest", "Conversion", "Conformists", "People's choise" etc. He has organised more than 60 exhibitions during the last four years.
> Conversion
Rosie Gunn is a photographer and video artist based in London. She is one of the founder members of 'Exposures', a group of women photographers specialising in images that confront traditional conceptions of gender and sexuality. Her work has been widely published and exhibited.
> Songlines
Ross Harley. Born in Sydney, 1961. Graduated (BA Hons) from Griffith University 1982. Has been working in a wide variety of media, creating videos and art projects for exhibition since 1986, most

recently the Digital Garden III at Ars Electronica in Austria, 1993. The former editor of the critical journal Art + Text, he was the director of the Third International Symposium on Electronic Art held in Sydney, 1992. More recently he has edited two anthologies, New Media Technologies and Artists in Cyberculture, published by the Australian Film Television and Radio School. He lectures in Theatre/ Film Studies at the University of New South Wales.
>Dig: An Archaeology ...
Graham Harwood: (UK) Author of the UK's first computer generated comic 'If Comix - Mental', an editor of Underground, and a member of the Fast Breeder BBS Collective. He is a part-time lecturer at the Guildhall University, London.
> Saddling the Troyan Horse
Nigel Helyer Born in 1951 in Hampshire, UK, 1883 arrived in Australia.1974 B.A., Liverpool College of Fine Art, 1979 M.A., Royal College of Art. Since 1979 solo and group exhibitions throughout the world. Performances, sound texts and commissions on radio, symposia and exhibitions. Critique and essays in several publications.
>Vectors and Virtual Space
Kari A. Hintikka media artist, free-lance journalist, researcher and non-fiction book writer who studies at MediaLab at the University of Industrial Arts of Helsinki, Finland. He has published three books, many essays and articles in newspapers and magazines and anthologies about the new media technology and its implications to society, communication and human mind. In1994 Hintikka is finishing his 3D animation project 'helsinki', which is a 3D structure of fictional cyberspace node without no real-time Internet connections simulating a possible front-end of a possible commercial computer network in the near future which Hintikka will use as a platform for several up-coming media-artworks.
> Virtual Identities - Inhabiting the Net
Srdjan Hofman was born in Glina in 1944, studied composing with Stanojlo Rajic̆c at the Belgrade Academy of Music, graduating in 1968 and acquiring and M.Mus. degree in 1972. Having completed his studies in Belgrade, he received advanced training in Stuttgart and Cologne. A prominent figure in Serbian music, he was, for a time, President of the Association of Composers of Serbia. Since 1974 he has taught at the Belgrade Faculty of Music, where he is now associate professor in the Department of compostion and orchestration. In addition to his teaching and composition, Srjdan Hofman has published articles on theoretical aspects of contemporary music in the journals "Zvuk" and "Tre'ci program".
> Specimens
Erkki Huhtamo was born in Helsinki, Finland 1958. He is currently acting professor of media studies at the University of Lappland, Rovaniemi, Finland. He has lectured widely in Finland and abroad and published essays and studies in nine languages. His publications include the first book on virtual reality in Finnish (1991). He has curated several international exhibitions of video art and interactive computer art. In 1994 he was a guest curator of the Australian International Video Symposium, Sydney. Professor Huhtamo also maintains E.M.M.I., his ever-growing (virtual) museum of audiovisuality.
> From Kaleidoscomaniac to Cybernerd. Towards an Archeology of the Media
Joseph Hyde is a composer and multi-media artist based in Birmingham, and a member of BEAST, a sound diffusion system dedicated to the promotion of electroacoustic music. His primary interests in music involve the combination of electronic resources with acoustic instruments and voices, and the combination of sound with video, computer animation and dance. His work has been performed and broadcast worldwide, and has won a number of prizes. Several works have been released on C.D.
>Songlines

Takahiko Iimura Nagoya College of Art and Design Takahiko Iimura has been a pioneer of Japanese experimental film and video art working in film since 1960 and video since 1970, and has had individual exhibitions at the major museums in the USA, Europe and Japan and has received international fellowships from different foundations.
> AIUEO NN Six Features
Sam Inkinen graduated from University of Vaasa 1994 with the topic of the utopia in the philosophy and virtual reality. At the moment Inkinen is academic researcher and lecturer. He has edited three books: The Reference Index of New Media, The Prehistory of the Future, Tekno - the history, philosophy and future of dance music.
> Sound of a Binary Machine
Troy Innocent Since 1989, Troy Innocent has been employing techniques of freeform mutation with computers to create experimental electronic art which has been exhibited internationally. Idea-ON>! is one in a series of hypermedia projects Troy has produced independently to explore the developing language of the new media. He continues to work with the group CyberDada, conceived in 1989, on performance, installation, and video projects, the most recent project being Techno Digesto Fetishism.
> IDEA-ON >!
> Nano in News SOS
> Techno Digesto Fetishim
Akemi Ishijima was born in Tokyo. She studied Electroacoustic Music at EMS and The Royal College of Music in Stockholm. Her works have been performed and broadcast throughout the world. She was the recipient of the Swedish Music Academy Scholarship and completed the degree of Master of Music in electroacoustic composition at the University of East Anglia, where she is currently studying for the degree of Ph.D under guidance of Dr. Denis Smalley.
> Ab ovo
Sadhna Jain is an Artist/Designer exploring a variety of digital and video processes in an attempt to confront and examine social and political issues. The most recent work vigorously debates the role of a cultural identity in the technological environment and proposes solutions which demand an imaginative interplay of the two. She is lecturer at University of Portsmouth, Department of design. U.K.
> Identity Crisis - Cultural Mapping
Roger Johnson is a professor of music and media studies in the School of Contemporary Arts at Ramapo College in New Jersey. His book Scores: An Anthology of New Music was published by Macmillan in 1981, and his current work on music and technology has been presented at many national conferences and published by Computer Music Journal and the College Music Society.
> Music Tehnology and Gender
Douglas Kahn is an American artist and writer currently living in Australia. He is coeditor of Wireless Imagination: Sound, Radio and the Avant-garde (MIT Press, 1992), author of John Heartfield: Art & Mass Media (Tanam, 1985) and, beginning in 1995, an editor of Leonardo Music Journal. His essays have appeared in such journals as October, Art & Text, InterCommunication, Music Today Biannual, Musicworks, Parachute, Performing Arts Journal, Public, Experimental Musical Instruments, and in the books Critical Issues in Electronic Media, Radio Rethink, In the Spirit of Fluxus and Sound by Artists.
> Amplifications...
Igor Kaminnik, Vadim Fishkin, Andre Sumatokhin Igor Kaminnik was born in 1963 in Odessa.Graduated from OTChKhP in 1984.Exhibitions since 1987.Sasha Grikorenko was born in 1967 in Moscow. Graduated from the Moscow Technology Institute in 1992. Lives and works in Moscow.Vadim Fishkin was born in 1965 in Penza. Art exhibitions since 1987. Andrey Schhelokov was born 1958 in Kohtla Yarve, Estonia. Graduated from MKhat Studio School in 1987. 1985-

89 worked at the opera and ballet theatres. Lives and works in Moscow, art exhibitions in Moscow. Andre Sumatokhin was born in 1963 in Moscow. Graduated from Moscow Institute of Architecture in 1987.
> Marquee

Mari Kimura After graduating from Toho school of Music in Japan with honors in violin performance, Mari Kimura came to the U.S. and was invited to participate in the Tanglewood Music Center as a fellow. Ms. Kimura attended Boston University to earn her Master's degree, then she received her doctoral degree in performance from Juilliard in May, 1993. Ms. Kimura studied composition with Mario Davidovsky at Columbia University. She was a visiting scholar at the center for Computer Research in Music and acoustics (CCRMA) at Stanford University. Her doctoral thesis for Juilliard is entitled "Performing electronic and computer - Some aspects of performance problems in relation with room acoustics."Ms. Kimura has given numerous Japanese premieres of contemporary compositions. As a composer, she has developed extended technique on the violin, including "subharmonies" which she uses in her own work for solo violin.
>The 20th Century Virtuosic...

Tom Klinkowstein is a designer and professor living in New York City. He has worked with clients that include NASA, Joseph Papp's Public Theatre, the Dutch Environmental Ministry and the Australian Broadcasting Corporation. Shows of his work have taken place at international art centers. He is currently an Associate Professor in the Graduate Communications Design Program at Pratt Institute in New York City.
> Inventing an Aesthetic...

Eric Kluitenberg, Arthur Elsenaar
> Corporeal-Machine-Anxiety

Ryszard W. Kluszczynski Born in 1952. Studied literature, theatre and film at the University of Lodz. Ph.D. in 1987. Assistant Professor at University of Lodz in Theory of Literature, Theater and Film Department. Film & Video curator in Centre for Contemporary Art, Uljazdowski Castle, Warsaw Author of 5 books and about 100 articles on experimental film, video art and avant-garde.
> Interactivity and the Problem of...

Knowbotic Research KR+cF:
Media Art Group, started 91, participants of internat. Media Festivals and Exhibitions (i.e. Videonale Bonn, Mediale Hamburg, Ars Electronica Linz, Interactive Media Festival Los Angeles, Siggraph Orlando) Yvonne Wilhelm, Christian Huebler, Alexander Tuchacek in collaboration with Academy of Media Art: Michael Hoch, Detlev Schwabe and GMD Bonn: Michael Pietsch supported by: Curator of BMUK Austria, Bundes- und Kunsthalle Bonn, Karl Ernst Osthaus Museum Hagen, Kulturamt Steiermark, Institute for New Media Frankfurt, Eurocreation Paris, Kulturbehrde Hamburg.
> Dialogue with the Knowbotic South...

Patrick Kosk studies in the Electronic-music studio at the Helsinki University. Since the beginning of the 80's mainly working as composer/sound designer in the Experimental Studio of the Finnish radio, working with electro-acoustic compositions but even closely with different collaborations on stage, in radio and short film with productions penetrating relations between acting, performance, dance, text, illumination to sound/music. His compositions have got recognition in international competitions. Kosk's musical thinking has partly it's roots in the Musique Concrète tradition.
> Distrak-Sillalla

Kimmo Koskela, Rea Pihlasviita Dancer-choreographer Rea Pihlasviita and photographer Kimmo Koskela have collaborated since 1989 in the field of media art, creating stage performances combining video and slide projections with live dance performance. Their latest creations have visited festivals in France, Germany and Denmark. Together they have also realised dance videos and clips for TV and they have been presented at many international dance video and media art festivals. In 1994 they started a series of telecommunication works.
> Talking Picture

Richard Kriesche Professor Richard Kriesche was born in Vienna. He teaches at the Hochschule für Gestaltung Offenbach, Germany in media theory and media practice, runs a cultural art-media-platform Kulturdata Graz, Austria. Organises media-art-projects on regional and global scale.
> Time-and-Information -Based Environment

Erkki Kurenniemi With a background of digital instruments and robotics, Erkki Kurenniemi currently works as senior exhibit planner at The Finnish Science Center Heureka.
> From 3D shapes to tonal harmonies ...

Machiko Kusahara born in Tokyo, currently Associate Professor of art and media technology in the Faculty of Art, Tokyo Institute of Polytechnics. Published widely about topics related to art and technology and edited 17 videodiscs about computer animation & visualization. She has curated several exhibitions in Japan, and was co-curator of the Australian International Video Symposium, Sydney, 1994. She is co-founder of the artist group Digital Image, and has exhibited her own computer graphic work as well, most recently at the Edge, Siggraph 1994 (Renga, with Toshihiro Anzai and Rieko Nakamura).
> What Digital Technologies Brought ...

Julie Kuzminska
> Chaos

Mikhail Kuznezsov, doctor of philosophy, works in the Institute of Philosophy of Russian Science Academy. Specialist in contemporary Western philosophy: Heidegger, Gadamer, Foucault, Derrida, Deleuze, Quattari, Lyotard etc. Specialised in theoretical analysis of the problems of virtual reality and cyberspace.
> The Prosthesis of Event...

Brenda Laurel has worked in the personal computer industry since 1976 as a programmer, software designer, producer, and researcher. She holds an M.F.A. and Ph.D. in theatre from Ohio State University. After two years as manager of software marketing for the Atari Home Computer, she moved to Atari Research to develop software architectures for dramatic virtual worlds. This work was published in her doctoral disseration in 1986. From 1987 until 1992 she worked as a design and research consultant in interactive media.She is currently a member of the research staff at Interval Research Corporation. In the summer of 1993 she was artist in residence at the Banff Centre for the Arts in Canada, creating the experimental virtual environment Placeholder. Laurel has published extensively in the areas of human-computer interaction, computer-based agents, and virtual reality. She is editor of the book, The Art of Human-Computer Interface Design (Addison-Wesley, 1990) and author of Computers as Theatre (Addison-Wesley, 1991).
> Pedagogy of the Oppressed...

George Legrady Born in Budapest in 1950, a Canadian citizen and a resident of California since 1981. Associate Professor in Information Arts at San Francisco State University, a program that integrates cultural theory and emerging technologies within the contexts of conceptual art and contemporary art practise. He is currently working on "Slippery Traces", an interactive multimedia project that investigates the experience of "seeing" within the context of today's vision tools, and the influence of their origins in medical and military technologies. His artworks have been exhibited in the US, Canada, France, Germany, Denmark, Mexico. During the fall 1994, Legrady will be a visiting faculty at the Budapest Art Academy.
> An Anecdoted Archive From The Cold War
> Equivalents II

Pierre Levy Born 1956. PhD's in information and communication sciences and sociology Consulting on the topicws of artificial intelligence, cognitive science, learning and computers, culture and digital revolution. Created Neurope Lab (European non-profit laboratory researching the 'knowledge age') and Trivium (software company that develops 'knowledge trees'). Published many books, most recently Les arbres de connaissance (Editions La Découverte) and Les nouveaux outils de la pensée (Editions Descartes), 1992. Professor in information and communication sciences in the hypermadias dept. of the University of Paris at St. Denis.
>Toward Superlanguage

Lieven Leroy - BS, Engineering and Applied Sciences, 1992, MS, Mechanical Engineering, Stanford, 1993. Lieven understands hardware in a way that has proved invaluable. At the same time he understands aesthetics and crazy artistic deadlines.
> Plasm: A Country Walk

Andrea Libretti received a diploma in Electronic Musical Composition from the Conservatory G. Verdi of Milan (his birth place) in 1983, after following composition courses with N. Castiglioni, B. Ferneyhough, and Kh. Stockhausen. He has worked as a music therapist with L.M. Lorenzetti at the Centro di Neurologia there. From 1982 to 1985 he was a member of the Board of Directors of the Centro di documentazione e studio per la musica elettronica (CEDME), and carried out research at the Centro di sonologia in Padua. He is a contributor to "Strumenti Musicali" and at present is a musical consulent in the network Channel 5.
> Segmento 3

Cort Lippe studied composition with Larry Austin. He spent three years in Utrecht, The Netherlands, at the Instituut voor Sonologie working with G.M. Koenig in the fields of computer and formalized music. Presently he lives in Paris, where he spent three years at CEMAMu, while following Xenakis' course on formalized music at the University of Paris. For the past seven years he has been employed at IRCAM, where he develops real-time musical applications and gives courses on new technology in composition.
> Gandy Bridge

David Clark Little (1952, USA). After receiving a BS in chemistry, he studied harpsichord and composition in the Netherlands. He has been a finalist and prize-winner in several composition competitions, including in the USA, Germany, France and Greece; and has been given many grants, for example to attend festivals and workshops in Germany, Holland, and the Soviet Union; and has received many commissions for compositional work. Since 1988 he has worked on compositional methods using the computer and based on the new "chaos science" and "fractals".
> Composing with Chaos...
> Hyperions Tumble

Marita Liulia a media artist, born 1957, works in Helsinki.
> Maire

Carl Eugene Loeffler is Project Director of Telecommunications and Virtual Reality, at the STUDIO for Creative Inquiry, Carnegie Mellon University, Pittsburgh, USA. He is also a visiting Senior Scientist, appointed to Center of Technology at Kjeller (UNIK/ University of Oslo and Norwegian Telecom Research) Specialist in the design of applications and systems integration for distributed virtual reality; under his direction, the CMU project team has produced a number of networked virtual reality applications for the purposes of education, entertainment and industry. The applications support multiple uses, and feature aspects of tele-existence. His current project is a distributed virtual city, which is conceived as a graphical user interface (GUI) for home based electronic shopping and entertainment.) Current technical demonstrations include the International Conference on Artificial reality and Tele-Existence,

Japan, and SIGGRAPH, USA. He is editor of Virtual Realities: Anthology of Industry and Culture.
>The Invisible Planet...

Geert Lovink
> Sovereign Media and Data-Dandy
Virginia Madsen was born in Australia 1960. Lives and works in Sydney. Independent radio producer, sound designer and writer. Works regularly for The Listening Room, ABC Radio. Her work has been broadcast in the USA and France. Currently working on the sound design for the inter-active performance SHOP with the Sydney group Open City. Current research toward a Doctorate of Creative Arts at the University of Technology, Sydney. Lectures regularly in the area of radio & sound studies.
> Sound Design, Nature and the Post-Real
Tony MacGregor was born in Australia, 1956. Lives and works in Sydney. Producer with The Listening Room, ABC Radio. (Australian Broadcasting Corporation) since 1984. Works also in collaboration with other artists to produce installation and performance works, including Zona Di Transito for the 1994 Adelaide Festival and Zona Del Silencio for the 1992 Biennale of Sydney.
> Sound Design, Nature and the Post-Real
John Manning, Chair of the Department of Art and Technology, School of the Art Institute of Chicago.
> Eliza's Children...

Jos'e Augusto Mannis
He finished his studies in 1983 with distinction, in composition with Electroacoustic Music and Musical Research, in the Conservatoire National Superieur de Musique de Paris. Since then, he dedicated himself to composition and research for the use of new electroacoustic instruments in musical creation. He is a member of the *.* Group since 1991.
> Electronic Carnival
Lev Manovich is an Assistant Professor of Imaging and Digital Arts at the University of Maryland Baltimore County, USA. His writes on visual culture of the electronic age. He has published articles in "Afterimage," "Design Issues," "Machine Culture" and edited "Textura: Russian Essays on Visual Culture" (University of Chicago Press, 1993).
>The Labor of Perception...
Benoit Maubrey Die Audio Gruppe Benoît Maubrey created the AUDIO BALLERINAS in 1990. Their Audio Uniform is made of 10 plexiglass "tutus" on which the electronics is mounted. These are powered by either solar cells or rechargeable batteries. The Audio Tutus are operated by trained dancers who in effect produce their own music by "stealing" sounds from their environment, amplifying them, and playing them back as a spontaneous concert. According to Maubrey the Audio Ballerinas are a form of street ballet that can also be understood as avant garde folklore.
>The Audio Ballerinas
Delle Maxwell is a design consultant and artist living in Princeton, New Jersey. She was also art director for the Geometry Center video "Not Knot", which was shown at the Siggraph Electronic Theater, and won an Auszeichnung at Prix Ars Electronica in 1992. She received her BFA from Rhode Island School of Design and her MS from the MIT Architecture Machine Group (now the Media Lab).
> Outside In: Mathematical Visualization...
Viktor Mazin, Olessia Tourkina
> Golem of Consciousness
Laurent Mignonneau, see Christa Sommerer
Brad Miller Born Sydney in 1961. Backgrounds in electronic engineering, graphic design and radio production (ABC).BA (Visual Arts) Sculpture Sydney College of the Arts. University of Sydney MFA candidate (Media Arts) College of Fine Arts. University of New South Wales. Currently researching Networked GUI's for Architectural Design & Computing Dept. University of Sydney
> A Digital Rhizome
Eduardo Reck Miranda, composer and expert on

electronic music, was born in Porto Alegre, Brazil, in 1963. He graduated in Data Processing Technology at the Vale do Rio dos Sinos University, Brazil in 1985. In 1991 he attained a Master degree in Music Technology at the University of York, England and in 1994 Ph.D. in Artificial Intelligence and Music at the University of Edinburgh, Scotland.
> An Artificial Intelligence Approach...
Alla Mitrofanova1983 graduated from the department of Art History at the State University of Leningrad. 1983-86 curator of Pavlovsk Palace and Park Museum of 18th and 19th century culture. 1987-89 Independent curator and art critic. 1989-94 Director of Art Critic Center in St. Petersburg. Member of expert committee of Soros Center for Contemporary Art. Organized several symposiums, seminars and held lectures e.g. on art, technology and communication, and written articles concentrating on communication.
> Art and Technology as the New...
Milla Moilanen graduated form the Design Institute of Lahti, dept. of fashion design. Since then she has worked with computer graphics, animation and graphic design and produces works for the Finnish Broadcasting Company, Heureka and the Museum of Contemporary Art.
> Deep
Artemis Moroni works with electronic media applied to interactive installations, as the coordinator of the *.* Group. Currently, she works at CTI - Centro Tecnológico para Informática, Campinas, as a researcher in Computer Graphics. Their projects includes Fractal Music, Robot's Choreographies and Drawings and ludic interactive installations for children.
>The Electronic Carnival
Margaret Morse teaches criticism and theory of electronic culture at the University of California at Santa Cruz. She has published art criticism on work in a variety of genres from single-channel video, installations, media-architecture and interactive art to virtual environments. Her publications on electronic culture treat topics from news, sports, aerobics, and talk shows and television events like the Romanian Revolution and the Gulf War to malls, freeways, cyberspace and issues such as What Do Cyborgs Eat?
> Enthralling Spaces...
>The Metaphor of Cave...
Julie Myers London-based computer artist, has exhibited throughout Europe and currently teaches at Kingston University.
> Trim to Fit
Rob Myers BS in Architecture, University of Southern California, 1973. Rob Myers brings a strong design sense to the interactive computer world. While holding down sundry day jobs as a user interface designer at the University of California at Santa Cruz, Qubix Graphics Systems and Silicon Graphics, he has collaborated with Peter in the construction of various virtual environments and artificial life forms over the last 18 years.
> Plasm: A country walk
Tapio Mäkelä Currently working as a director in Helsinki for MUU r.y., an artists' organisation for media arts, video, performance and environmental art. B.A. in cultural history, University of Turku, M.A. in progress. Also a free lance journalist, former editor-in-chief of Turun ylioppilaslehti, a weekly based in Turku. Co-editor for Virtual Zoneand four other publications. Aim: combining cultural theory with visual arts.
> Electronic Space: an Imaginary Conquest
Christian Möller Studied architecture and visual arts; specialized in audiovisual architecture projects.
> The Audio Pendulums
Michael Naimark spent 12 years as an independent media artist before joining Interval Research in 1992. Naimark has held faculty appointments at the San Francisco Art Institute, San Francisco State University, Cal Arts, M.I.T., the University of Michigan, and is on

the Editorial Boards of Presence and Leonardo Electronic Almanac. His artwork has been exhibited internationally.
> Field Recording Studies
Joseph Nechvatal is an American artist, who has been working as artist in residence at the Louis Pasteur studio in Arbois, France, since 1991. He also works at Ledoux Foundation's computer lab near Arbois. His specific project is to experiment with computer viruses as a creative tool.
> The Computer Virus Project
Ola Odegard is a researcher at the Norwegian Telecom Research. He is a sociologist and a computer scientist with specialty on user aspects in terminals and applications. He is currently in charge of developing the Virtual Reality Lab and the VR development team at Norwegian Telecom Research in Kjeller, Norway. This includes prototyping of VR applications for culture, education, entertainment and industry, which will be tested using telecommunications networks of various bandwidth.
> The Invisible Planet...
Klaus Oesch (Mediayhtiö Sansibar Oy) Media Company Sansibar is a Finnish producer of interactive digital media. It is acting at Tampere in close connection with Tampere University and it's Hypermedia laboratory, which is the leading center for interactive computer production education in Finland. Sansibar has designed the first Finnish interactive CD-ROM in March 1994: The Media Museum for consumers. The Finnish State Audiovisual Center is the primary funding partner and the promoter of the project in Finland.
> Media Museum
Keisuke Oki see Digital Therapy Institute (DTI)
> Virtual Haze
Vito Orazem
> Holography as an Element of Media...
Marko Peljhan Studied stage directing at the University of Ljubljana. In 1993 he founded PROJEKT ATOL, an on-going art project that includes work in diverse media (theater, film, computer work, performances/lectures). At the moment he is producing his new scenic and media work LADOMIR.
> Science of the individual...
Simon Penny, interactive media artist, Associate Professor of Art and Robotics, Carnegie Mellon University, Pittsburgh PA . He makes interactive installation and robotic sculpture and is currently in danger of falling of the edge of Art into the the maelstrom of technological change.
> Elizas-children: Complexity, Emergency...
Elena Popa Her innovative computer animation work has been exhibited internationally, and she is also involved with electronic based hypermedia and performance projects with CyberDada, including the recent "Techno Digesto Fetishism" project. She also lectures in 2D and 3D computer graphics, maintains a professional multimedia practice, and regularly exhibits her electronic art in gallery exhibitions.
> Nano in News SOS
>Techno Digesto Fetishism
Ken Rinaldo Robotic artist, proprietor of Interactive Emergent Systems, San Francisco CA.
> Elizas-Children...
Sadie Plant (UK) Author of 'The most Radical Gesture' and Lecturer at the Dept. of Cultural Studies University of Birmingham. Her forthcoming book is 'Beyond the Matrix: "Women and Technology". She is the primary theorist of 'Cyberfeminism'.
> Saddling the Troyan Horse
Nina Pope Trained as a Fine Artist specialising in print-making in Scotland. Worked for a time in a printworkshop before coming to London to do her MA at Chelsea College of Art, where her interest in computers began. Her work is concerned with perceptions of spaces real and imagined and is often based around garden imagery. Currently teaching computing for the Bartlett School of

Architecture,University College London.
> Herbaceous Protection...
Dmitri Prigov Dimitri Aleksandrovich Prigov was born in 1940. Graduated from Sculpture Department in Moscow. Artist, poet, prose writer, performance-maker, theoretician. Exhibitions in many countries, a big number of translations. Leading figure of Moscow Conseptualism.
> Evgeny Onegin
Catherine Richards Media artist. Her work explores the permeable boundary between fiction and science and investigates the body and the self as the site for new technology. She was awarded the Canada Council of the Arts' Petro-Canada biennal award for Media Arts, 1993, for her innovative use of new technologies in media arts in particular her virtual-reality project Spectral Bodies. She was responsible for initiating and co-directing the Bioapparatus, an artists' residency on the subject of art and intimacy of the body with new technologies, at the Banff Centre for the Arts, Canada. In 1992 the Bioapparatus won the Canadian Conference of the Arts' Korel Prize for innovative projects in arts and new technologies.
>The Virtual Body
Gia Rigvava was born in 1956 in Tbilisi. Graduated from Moscow International Relations Institute in 1978 and Surikov Art Institute in Moscow in 1986. Started creative activities in 1987. Active participant in artistical processes in Moscow in Post-soviet time - from 1992. One of the most visible figures in the Russian art in the 90's.
> You can trust me...
> A General Overview...
RinneRadio offers fearless forays into an eclectic and broadly jazz-based musical world.Tapani Rinne, sax; Kajasto; sounds & rhythm; Jari Kokkonen sounds & bass; Janne Lehto, guitar
Kathy Rogers is an electronic artist trained in virtual reality applications. Senior lecturer and researcher at Duncan of Jordanstone School of Television and Electronic Imaging, Dundee.
> Non-explicable phenomena
Jon Rose started playing the Violin at the age of seven, gave up formal music education and from then on, was mostly self-taught. Throughout the 1970's he played, composed and studied in a large variety of music genres - and became the central figure in the development of free improvisation in Australia. In 1986 he moved to Berlin, where he directed the first Relative Violin festival with over 50 violinists from all around the world. Jon Rose has appeared on over 40 records and CD's, directed Das Rosenberg Museum (a surrealist satire for ZDF, Germany 1991), released a book The Pink Violin (NMA, Melbourne 1992).
>Violin Music in the Age...
Cynthia Beth Rubin is on the faculty at the University of Vermont, where she is responsible for the computer area within the Department of Art. Working in fixed imagery and animation, she uses the computer as a means to engage in cultural dialogue, integrating images from diverse epochs and cultures. Her work was shown most recently at the Rendez-vous d'Imagina in Paris and Marseilles, the Kalisher computer art show in Tel Aviv, and Imagine 94 in Utrecht.
> Output Sufferings: After the Virtual
> Running to Stay in Place
Stephen s'Soreff American artist. Exhibitions since 1979. Works in the collections of several American and European art museums.
> Art Futures
Savadov, & Senchenko / Arsen Savadov, Kiev, and Georgii Senchenko, Kiev, Ukraine were born in 1962.They graduated from Kiev Academy of Art 1986. Exhibitions in Russia, Europe and the USA.
> Work in progress
Jeffrey Schultz is an artist and writer. His work has been shown at The New Museum of Contemporary Art, and he will have a show at TZ'Art & Co. in New

York this fall. He has presented his work at the Fourth International Conference on Cyberspace, and the 1993 College Art Association Annual Conference. His writing has appeared in Leonardo; Machine Culture, the SIGGRAPH '93 Art Show catalogue; and Critical Matrix. He is currently writing a book titled "It's a Virtual Life: Information Technologies and the Flickering Fabric of Social Relations."
> Hyperformance
Jill Scott Born in 1952. Studied Fine Art and Communications at San Fransisco State University. Since 1975, numerous individual and group exhibitions of works in video, computer graphics, interactive installations and performance. Currently works at the Hochschule der Bildenden Kunst, Saar, Germany.
> Paradise Tossed...
Henry See Media Artist, Organizing Committee ISEA 95 (Montreal), visiting professor of computer art, University of Vermont, Burlington.
> Elizas-Children...
Alexander Sekatsky born 1958, graduated from The S. Petersburg University in 1988, Mg. Ph. (1990). The visiting professor in The Humanitarian Institute of St. Petersburg, provisional lecturer of the philosophical faculty, an organizer of art exhibitions and symposiums on art and philosophy: The Ontology of Lie, The Research of Simulacra, The Falsification of Desires, The reflective Operation of the Sense-sphere.
> The Tools of Desire and New Technologies
Paul Sermon British media artist specialized in performance based telematic installations. MFA 1991. Lecturer in Interactive Media Arts at the University of Reading 1991-92 and in Telematic Media at Gwent College of Higher Education 1989-1992, at Hochschule für Grafik and Buchkunst Leipzig from 1993 to date. Artist in residence at Zentrum f'r Kunst und Medientechnologie in Karlsruhe in 1993.
>Telematic Vision
Zack Settel studied composition at the California Institute of the Arts (CalArts) with Leonard Stein, Morton Stubotnick, and Mel Powell. Since the fall of 1986 he has been living in Paris. He received a Fullbright to pursue musical studies at IRCAM, where he continued the following year with a grant for Music Composition from the French Ministry of Education. His compositions include chamber works, electronic music studio works, film scores and live electro-acoustic pieces (chamber works with live electronics). His work is mainly focused on the latter. His pieces are performed in North America and in Europe and Asia. His music has been recorded by Diffusion Média.
> Gandy Bridge
Stine Schou born 1967.Student at Aarhus University/ Information Science and art history. Since 1991 collaborating with Jorgen Callesen.
> Lailah
Jeffrey Shaw is an artist who has been making interactive electronic installations since the mid 1960s. His works have been exhibited at major museums and festivals world wide. He s Director of the Institute for Image Media.Zentrum fur Kunst und Medientechnologie, Kaiserstrasse 64 Postfach 6919, 76049 Karlsruhe 1, Germany.
> EVE
>The Invisible Planet...
>The Methaphos of Cave in...
Techla Shiphorst
> Algorithms and the Artist
Zoe Sofoulis, Virginia Barratt FEMBOT-LIB
> Women Remapping Technospace
Christa Sommerer, Laurent Mignonneau (Institut für Neue Medien) Christa Sommerer studied Biology (Botany) and Arts (Sculpture) in Vienna, Austria. Since 1990 she works on the combination of Arts and Science. Early works questioned this relationship in a metaphorical sense.Laurent Mignonneau's studies include Experimental Music, Applied Arts and Design

and Computer Graphics. Since 1992 Sommerer and Mignonneau collaborate in the research for new interfaces and real-time interactive computer installations and the field of "Artificial Life".
> Anthroposcope

Rejane Spitz is an Assistant Professor of Computer Graphics in theDepartment of Arts of Pontificia Universidade Catolica do Rio deJaneiro, Brazil. She received her PhD in Education from PUC-RioUniversity (Brazil) in 1993, and her MA in Graphic Design from theCentral School of Art & Design (England) in 1983. Since 1991 she is theACM SIGGRAPH Education Committee South American Representative. She is an Editorial Advisor of LEONARDO (1993-1995). She also coordinates the South American branch of the Inter-Society for the Electronic Arts
>Transcultural Approaches...
Stelarc is a performance artist who is interested in alternate aesthetic strategies. He has used medical, robot and Virtual Reality systems to extend the body's performance parameters. As well as his Third Hand, Virtual Arm and Stomach Sculpture projects, he is presently working on a touch-screen computer interface for an 8-channel muscle simulator. A system to enable the physical interaction of remote bodies. A kind of cyber voodoo.
> Stomach Sculpture...
Stahl Stenslie Norwegian artist, born 1965. Studied in Oslo Art Academy, Düsseldorf, Cologne. Exhibited art works since 1985. In the 90's worked on several computer related art projects.
> Liquid selves - Schizoid bodies
> Cyber SM III
Mike Steventon: (Canadian) Member of Despite TV collective, long standing producers and distributors of radical video form around the world. He has for a long time been a participant in, and documenter of, grass-roots BBC culture.
> Saddling the Trojan Horse
Maria Stukoff is an independent artist working with computer animated environments and live performance. Nicholas Gebhardt is a radio producer, writer and a musician who is currently completing his' Ph.D on jazz and modernity in the History Department, University of Sydney.
> The Time of Our Life...
Yevgeni Svyatski was born in 1957. Graduated from moscow polygraphical institute (Department of book graphics) in 1980. Works on book and advertising design, graphics and poster art.
David Tafler is a member of the Media Studies faculty of Widener University near Philadelphia, Pennsylvania. He has written extensively on interactive media and new technologies. His articles include "The Techno/Cultural Interface" (co-authored with Peter d'Agostino) Media Information Australia, "Der Blick und der Sprung," Kunstforum, "The Circular Text," Journal of Film and Video, "Beyond Narrative: Notes toward a theory of interactive cinema," Millennium Film Journal, and others.
> Cyberspace: Configurations of Space...
Christine Tamblyn (San Francisco State University) Christine Tamblyn is a conceptual artist and critic who teaches at San Francisco State University. She has published over 100 articles in art magazines, catalogues, textbooks and anthologies. Her performances and videotapes have been shown widely at artists' spaces, museums and academic conferences. Her interactive CD-ROM has been presented at many venues including "Seduced and Abandoned: The Body in the Virtual World" at the Institute of Contemporary Arts in London; Pacific Film Archives at the University Art Museum in Berkeley, California; "The Illustrated Woman" at the Yerba Buena Center for the Arts in San Francisco; the San Francisco Exploratorium; "4 Cyberconf" at the Banff Center in Alberta, Canada; SIGGRAPH' 94 in Orlando, Florida and the Australian International Video Art

Symposium in Sydney.
> She Loves It, She Loves It Not...
Jeffrey Taylor
> The Net Effect
Jukka Tiensuu (1948-) is one of the internationally best known Finnish instrumentalists; as a harpsichordist, pianist, conductor and composer, he is often associated with the musical avant-garde. Yet his repertoire is exceptionally broad - he has also steeped himself in the study of authentic performance of early works. Tiensuu has concerted in the U.S., Asia, and in most European countries. He has lead courses on both Barocque and contemporary music. Tiensuu's own composing output extends from solo works for the kantele (zither-like Finnish folk instrument) to choral and orchestral compositions, from pieces for accordion ensemble to electronic and computer music.
> Sound of Life
Heidi Tikka is a film and installation artist. She received her MFA at the School of the Art Institute of Chicago. She is now working on her postgraduate thesis at the University of Art and Design in Helsinki and teaching computer graphics there at the Department of General Studies.
> Vision and Dominance...
> A Dialogue with Hunger
Rob Tow At Interval research Rob Tow is engaged in active research into gendered constructions of space and interface. As a working scientist with two granted and three pending patents in applied visual psychophysics, he has a wide background in psychophysics and perception - and has worked at Xerox PARC and Schlumberger Palo Alto Research with 18 years of experience in image processing, graphics, and applied vision. He also has studied the history of art (including a deep descend into Renaissance perspective). He is a white male who wrote half the code in the Placeholder virtual reality project that Brenda Laurel created.
> Pedagogy of the Oppressed...
Fred Truck has been working in electronic media since 1980. In 1984, he published an innovative text that could only have been done electronically— George Maciunas, Fluxus and the Face of Time. This work is in the library of the Modern Art, and many other museums here and abroad. In 1986, he co-founded the Art Com Electronic Network with Carl Loeffler; it has been on-line continuously since then. His most recent work is The Labyrinth, a virtual reality art work which featured Leonardo da Vinci's Flying Machine. The Labyrinth was shown in the Machine Culture art show at SIGGRAPH '93.
> The Invisible Planet...
Joan Truckenbrod exhibits her artwork internationally. She recently was invited to give a presentation at the Institute of Contemporary Art in London at a conference on Cyberspace and the Arts. She has received a grant to work collaboratively with the faculty at the Department of Media and Information Science, Aarhus University, in Denmark, on an interactive multimedia project. Ms. Truckenbrod is on the faculty at The School of the Art Institute of Chicago, and is Chair of the Time Arts Department.
> Gender Issues in the Electronic Arts...
Mika Tuomola, born 1971, student at the Media Lab of the University of Art and Design Helsinki UIAH. Organizer of the Shakespeare in Hypermedia project, collaborator in the Hyper-Hamlet CD ROM.
>Toward New Structures
Gregory Ulmer is a professor of English and Media Studies at the Universityof Florida. He is the author of APPLIED GRAMMATOLOGY (1985); TELETHEORY (1989)and HEURETICS: THE LOGIC OF INVENTION (1994). Ulmer has co-authored atextbook (TEXT BOOK), served as academic adviser and on-camera critic for a telecourse on literature (LITERARY VISIONS), made video tapes with Paper Tiger Television and the Critical Art Ensemble (distributed by

Drift). He is Coordinator of the Florida Research Ensemble (a group developing a new approach to the practice of consulting) and an officer in the Florida Media Arts Center, involved with the project for Creating an Electronic Community. His work-in-progress is the design of a series of electronic monuments; also the production of a handbook for people who would like to take up theory as a hobby. Ulmer's courses at the University of Florida are designed as experimental tests of the theory of electronic rhetoric proposed in HEURETICS.
> The X Tables. Dialogues...
Roman Verostko, FISEA 93 Program Director; Professor, Minneapolis College of Art & Design. As a Bush Fellow he researched the "changing role of artists" at the Center for Advanced Visual Studies (MIT, 1970). His seminal paper "Epigenetic Painting: Software as Genotype (1988) identified biological analogues to autonomous form generating procedures. His "epigenetic art" includes a limited edition of George Boole's "Derivation of the laws..." Awards: Golden Plotter First Prize (1994); Ars Electronica Honorary Mention (1993). Exhibitions include: "Genetische Kunst - Kunstliches Leben" (Linz 1993); "TISEA" (Sidney, 1992); "SIGGRAPH 1991, 1992" (Chicago, Dallas, Computer Museum, Boston); "Data Data" (Baltimore, 1994).
> Algorithms and the Artist
>The Diamond Lake Apocalypse
Victoria Vesna is a video, performance and installation artist. Her work has been shown at the Venice Biennale (1986), P.S.1 Museum (1989), Art in General (1993) and Long Beach Museum where she serves as chair of the media council. She is currently an assistant Professor at UC Santa Barbara where she has initiated a collaborative effort between the Art Department and the College of Engineering.
> Cyberspace: Configurations of...
VNS Matrix / Julianne Pierce, Josephine Starrs, Virginia Barratt, Francesca da Rimini. VNS Matrix is an Australian artists' collaboration who create hybrid electronic artworks which ironically integrate theory with popular culture. As feminists, we explore language, sexuality and power from subversive and ambiguous positions. As cyberfeminists, our mission is to hijack technology and remap cyberspace.
> Pathogenic Vectors
> ALL NEW GEN
James Walker, born in London 1948, painter, exhibitions: Hayward Annual 1979, Whitworth Manchester (one-man) 1985, SISEA Groningen 1989, FISEA Minneapolis 1983, Computerkunst Gladbeck 1994. Tutor in Computing at RCA 1989 - 1993. Editor Artscribe Magazine 1976 - 1983, articles on computers in art in Modern Painters (92, 94).
> Computers, Painting and Ambition
Annette Weintraub is a visual artist working with digital image processing whose work examines the architectural environment. Her work will be seen this fall in "Metamorphoses: Photography in the Electronic Age", curated by Aperture Magazine at the Fashion Institute of Technology. Her work is represented in many public collections. She received grants from the New York Foundation for Art (1991), The CUNY Research Foundation (1990,1993), and resident grants at Yaddo (1979, 1989). Annette Weintraub is Professor of Art at The City College of New York, where she directs the Robinson Center for Graphic Arts and Communication Design.
> Night Light the Remanufactured...
> Running to Stay in Place...
Jeremy Welsh 1990-94 head Intermedia, Kunstakademiet Trondheim. 1988-90 Director, Film and Video Umbrella. 1982-1987 Program Director, London Video Arts Exhibited and published internationally since 1980 - Media art.
> A Hybertalk
Mary-Anne Williams is a Lecturer in Information Systems, at the University of Newcastle in Australia.

Her research interests lie in Aesthetics in Art and Science, Artificial Intelligence, Belief Revision, Creativity, Explanation, Knowledge Representation, and Logic and Design.
> Aesthetics and Artificial Intelligence
Leslie Wilson
> A Lithuanian Lullabye
Axel Wirths (235 Media), born 1960, is founder and director of 235 MEDIA in Cologne, international media art distributor. He has organized several exhibitions, festivals and TV-series, held numerous lectures, written articles and got scholarships. 1991 Adolf Grimme award for TV series "Donnerstag". Founder of the first Mobile Electronic Caf'e. Since 1993 works as a curator for Media Arts at the Kunst-und Ausstellungshalle of FRG in Bonn.
> Artistic Electronic Networking
Kirk Wolford American artist, born 1967. Master of Science, Master of Fine Arts: Photography Institute of Design, Chicago, Illinois, 1992. Has been teaching digital photography, computer graphics and hyper media at School of the Art institute of Chicago and Illinois Institute of Technology. Presently works as a guest instructor at Kunsthochschule für Medien in Cologne, Germany. Has exhibited digital photography and interactive electronis art work since 1988.
> CyberSM
Richard Wright was born in 1963 in Barnet, England. He is a electronic media artist, writer and lecturer. Since 1991 he has been a lecturer in Computer Graphics at London Guildhall University.
> It Looks Just Like Art....
> Art and Science in Chaos...
Yuxweluptun (white man's alias: Lawrence Paul) is Cowichan-Okanagan, born 1957 in Kamloops, British Columbia, Canada. Lives in Fort St. James, British Columbia. Studied at the Emily Carr College of Art and Design, Vancouver, British Columbia. Painter: also works with advanced technologies, in particular virtual reality. Has exhibited mainly in western Canada and the western United States, and recently in Lost Illusions: Recent Landscape Art, Vancouver Art Gallery, 1991, and Indigena, Canadian Museum of Civilization, Hull, Quebec, 1992.
> The Invisible Planet...
Michaela Zabranska (Computer Graphics Research lab./Simon Fraser University, Canada): Director Michaela Zabranska studied fine arts in the Public College of Art in Prague, Czechoslovakia and computer craphics in the Czech Technical University (CVUT), Faculty of Technical Cybernetics, Prague.
>"First Political Speech"
Wolfgang Ziemer born 1949 in Epe, Germany. 1980 established the private OFFENE GALERIE. 1983 established the non-profit association OFFENE GALERIE e.V. 1986 organized the first international symposium in Germany on art and communication. 1988 established the non-profit association ARTCOM IN DEUTSCHLAND. Participation in L'EUROPE DE CREATEURS and ARTTRANSITION M.I.T., Mass. USA.
> European Interactive TV
Eric Zoran (Belgrade, 1950) is one of the most significant Serbian composers of the middle generation. He studied Composition with Stanojlo Rajicic at the Belgrade Academy of Music, where he graduated and acquired a MM. degree. He spent a short time at the Orff Institute in Salzburg and in the CCFUM at Groznian, where he took part in summer courses and the master class for Composition led by W. Lutoslawski. Since 1980 Zoran Eric is an eminent full-time professor at the Belgrade Faculty of Music (Department of Composition and Orchestration). His works have been performed in almost all European countries, in the USA, China, and have achieved considerable succes at festivals and concerts in London, Paris, Athens, Prague, Berlin, Amsterdam and Beijing.
>The Great Red Spot of Jupiter

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LEONARDO

Roger F. Malina, Executive Editor

Leonardo is the leading journal for anyone interested in the application of contemporary science and technology to the arts. The journal of the International Society for the Arts, Sciences and Technology (ISAST), *Leonardo* covers a wide range of topics including media, music, kinetic art, performance art, language, environmental and conceptual art, computers and artificial intelligence. Subscribers can also receive the companion annual *Leonardo Music Journal (LMJ)* which comes with a compact disc and features the latest in music, multimedia, art, sound science, and technology.

Additionally, The MIT Press now publishes Leonardo/ISAST's *Leonardo Electronic Almanac*. Available online over the Internet each month, this newsletter reports on current perspectives in the art-science-technology domain.

MARINA CONGRESS
CENTER

electronic theatre

Welcome to Europe

Lufthansa