

ise@97 Chicago



Conference Proceedings

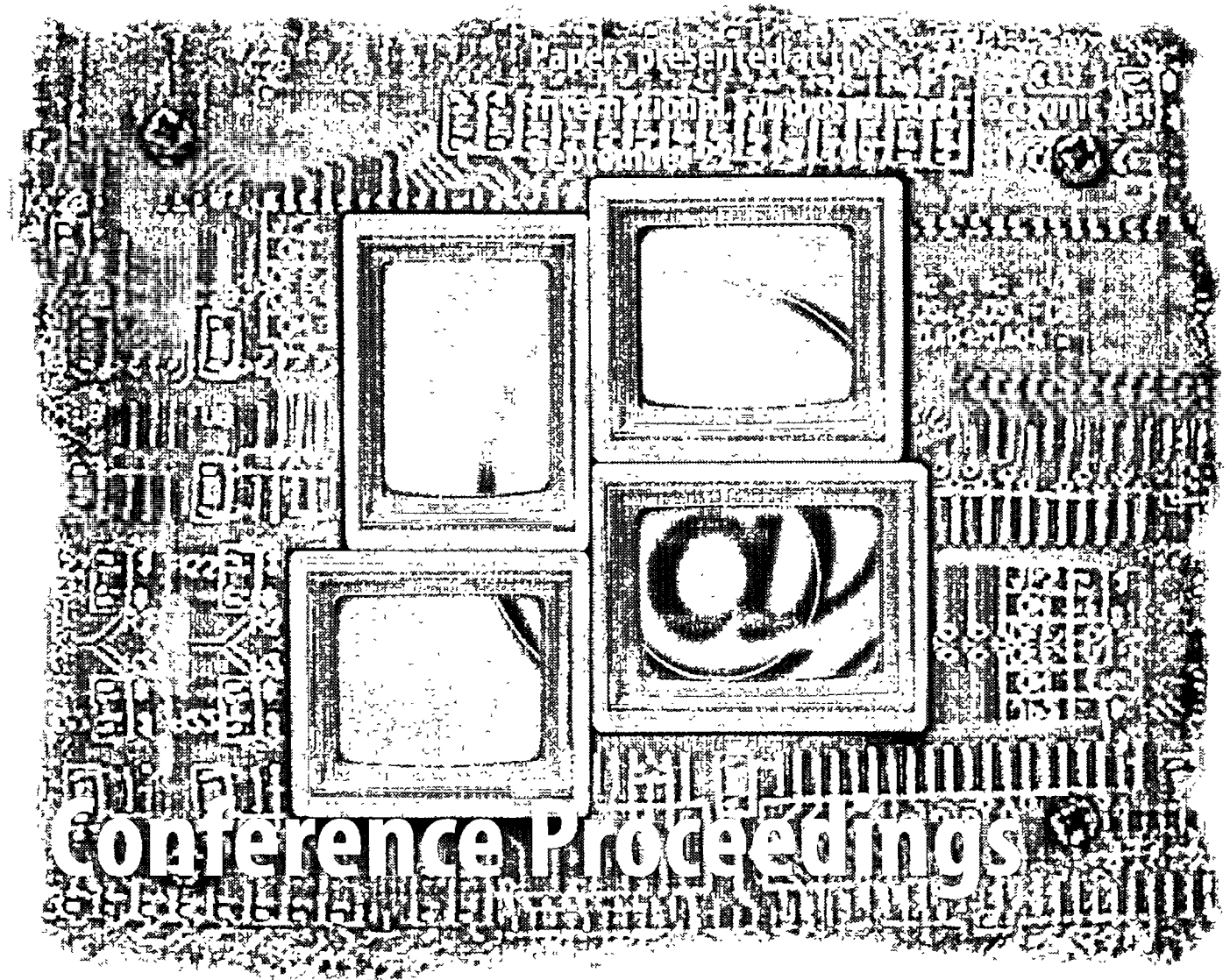
Papers presented at the
International Symposium on Electronic Art
September 22 – 27, 1997

Presented by

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The Seventh International Symposium on the Electronic Arts, with its accompanying exhibitions and performances, was so varied and intense that it was impossible for any given person attending the events to come away with the same understanding as someone else. Hosted by the School of the Art Institute of Chicago from September 22 to 27, *ISEA97* featured more than three hundred presenters, performers, and exhibitors. While this rich variety of possible experiences is one of the great delights of every ISEA conference, an even greater pleasure, in retrospect, is having the chance to read those papers which were missed the first time around. Anyone who felt some consternation at having to make a difficult choice between equally interesting papers has in this volume a chance to escape the horns of that dilemma.

This collection of academic papers illuminates the ideas of the symposium with a clarity that would have been impossible for any single conference attendee to grasp. Because only the officially accepted academic papers are represented here, some of the ambiance and individual voices are still missing. When the accompanying CD-ROM volume is issued, however, it will be feasible to peruse all of the submitted presentations, panel notes, and a modest sampling of the exhibited artwork. If it is possible to reconstitute an emerging art form at a given point in its growth, the CD-ROM is the best tool for the task. Because there is also an important historical value in being able to examine all the written material that was submitted by the artists before, during, and after the conference, performances, and exhibitions, the CD-ROM, with its catalogued index of PDF files, will most likely be the art historian's choice for research.

If it seems curious to be placing the ISEA97 conference in a historical context so quickly, consider the difficulties yet to be faced by curators and historians of electronic art in the near future. An art that is increasingly based in performance, and utterly dependent on irrevocably obsolete processors and notoriously fugitive media, may paradoxically survive better in light of the artists' exegesis in this volume and its companion CD-ROM. The symposium's theme of "Content" endeavored to diminish the emphasis on new media tools themselves, in favor of the actual artistic product — what was significant and important about the work, how ideas formed by electronic means interacted and merged with those from traditional media and art making, and other issues related to why we use technology, rather than how.

Our ability to bring together the necessary resources to publish these proceedings depended on the support of Anthony Jones, President of the School of the Art Institute of Chicago; Dean Carol Becker; Vice-President of Planning Jonathan Lindsay; Paul Elitzik of the SAIC Press; and the entire school administration. Kathi Beste and the Publications staff worked wonders for us in the midst of much larger projects.

In acknowledging all of the inspiration, support, expertise and hard work by others that have gone into producing this book, neither Anders Nereim or Shawn Decker can avoid accepting responsibility for the actual shape of these proceedings. Shawn's galvanizing theme of "Content" added immeasurably to the effervescence of the event, pulling in hundreds of submissions and potential participants. Who knows if it will remain an effective rubric for understanding the art and thinking of the symposium? Anders is ultimately responsible for any errors or omissions that occurred in collecting, shepherding, and translating these marvelous papers across the boundaries of high ASCII characters and inscrutable operating systems.

A handwritten signature in black ink, appearing to read "Anders Nereim".

Anders Nereim, ISEA97 Proceedings Editor

A handwritten signature in black ink, appearing to read "Shawn Decker".

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Cybrids:

Integrating Cognitive and Physical Space in Architecture

Spaces and Media

Spatial constructs – cognitive spaces – result from the mind's composing an image of the world. They allow objects to be related to one another, making comparison, relationship and evaluation possible. They also play a primary role in relational and qualitative judgment. Qualitative thought depends on information set in context and allows people to evaluate issues with respect to one another before taking action. It helps us select a brand at the grocery store or size a window in a façade.

The diagram below illustrates information flow within a model of our cognitive space (Fig.1). The *Objective World* is the outer world of *Data* and unprocessed information. Through the process of *Sensation* this information passes through the *Somatic Boundary* via the senses and enters the *Subjective World* of the body. It then passes through a *Cultural/Language Boundary* where it is processed and preliminarily interpreted. Here distinctions are made between words and sounds, images and illumination. The mind then places these sensory images within the *Outer Cognitive Space* where they are regarded. This space is where experiential information resides. Through the process of *Personal Interpretation*, prioritized information may be passed to the *Inner Cognitive Space* and manipulated symbolically or stored in *Memory* for future use. Expression passes information from the Inner Cognitive Space through the Cultural/Language Boundary and through the Somatic Boundary through the organs of expression. Once the information enters the Objective World it may be retrieved by its creator or others as data.

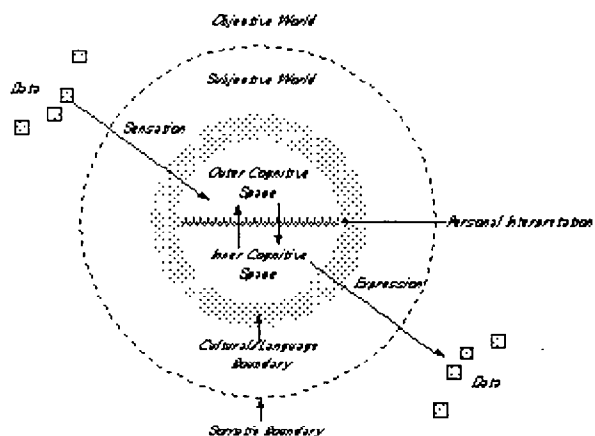


Figure 1

Architecture and Cyberspace

With the increasing spatialization of the Internet, computers now can display networked information spatially. This is an important advance as it ties into our basic training as humans. While there is no assurance that this matrix is the same from one person to the next it is an attribute we share as humans and possibly with other creatures as well.

I have studied the impact of information technology on architecture. My work has addressed cyberspace as a deep spatial environment affected by social, organizational and aesthetic issues... not unlike architectural spaces. However, comparisons between physical and cyberspaces must account for their differences.

Four issues relate physical space to cyberspace:

- 1) Parity between physical and cyberspace via cognitive space;
- 2) The resultant transformation of physical architecture;

- 3) The anomalies of translating the spatial metaphor to 3D environments;
- 4) The possibility of creating hybrid schemes – hybrids – that exist both in physical and cyberspaces.

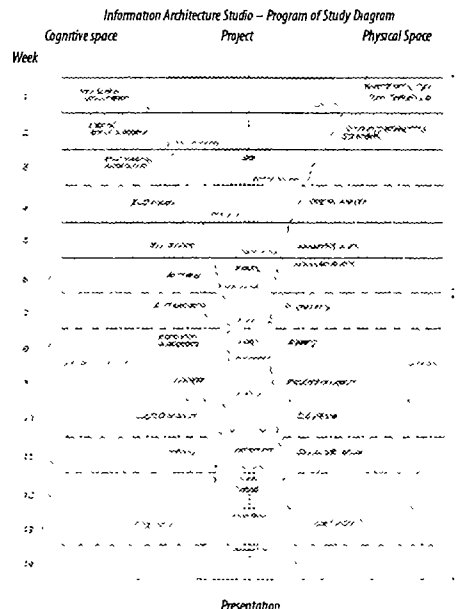


Figure 2: This schedule graphic developed for the Information Architecture Studio shows the concurrent development of physical and cyberspace strategies. The Definition/Analysis portion of the semester dealt with each separately. The Generation/Synthesis portion brought the two strategies together in one project.

Cyber/Real Parity

In the spring of 1997 my graduate architecture design students at the University of Michigan worked on a project which related cognitive space – as exemplified by cyberspace – and the space of physical architecture. The semester was divided into research and design phases. The research phase was a concurrent study of physical and on-line environments. It included an investigation of on-line communities and an analysis of four buildings on the campus. These buildings included a library, museum, classroom building, and an auditorium. The studies of the physical buildings were represented as information while the on-line spaces – Multi-User Domains (MUDs) – were resolved as physical objects. The reciprocity between the physical and cyberreal is indicated in the semester schedule chart [Fig. 2].

Sublimation and Reification

In teams of three, the students documented each building, doing formal, functional and typological analyses of their organization. While this is standard procedure in many architecture schools, here the focus was on information and its influence on architecture. The students were transforming an existing physical building into manipulable information for future use in their own design.

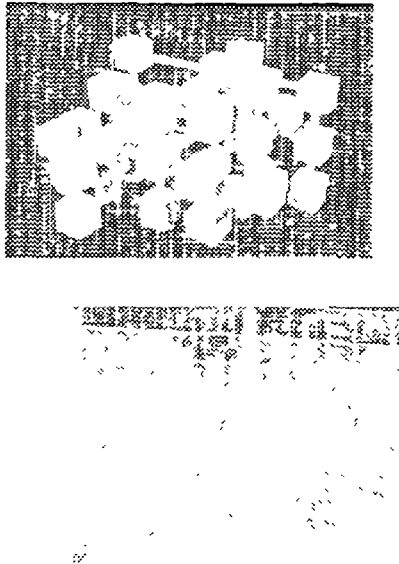
As the teams analyzed the buildings, they also researched MUDs on the Internet. With one exception, Alphaworld, these domains were text-based social MUDs. MUDs are similar to chat rooms and BBSs (Bulletin Board Services) which serve as on-line meeting places. They are distinguished by their use of spatial metaphors setting the dialog – the way a stage set hosts a play. Because both the spaces and their occupants are described rather than depicted, there is much ambiguity in using a MUD.

The students derived the logical structure of the MUDs by navigating them in groups and mapping them according to cardinal directions. If a room was accessed using an "n" command, it was mapped as a cube situated north from the previous room. Rooms not accessed this way are mapped as spheres connected arbitrarily to the previous node. The resulting Logical Adjacency Maps, LAMs, were built as physical models to stress their presence as cognitive objects. Since the

physical buildings were also mapped in this way, it was possible to compare the structures of the sublimated architecture with the reified MUD environment [Figs.3, 4].

Cybrids

The students then developed programs for their own building design. In the functional analysis of the physical buildings, the students had to derive the subject building's program - working backwards from its plans and sections. They took the existing building program, modifying it in response to their on-line analysis.



Figures 3, 4: Top: The logical adjacency map (LAM) of a local art museum built by Dang Nguyen and Christopher Kretovic. Bottom: A LAM of Meridian, a MUD by Ying-Huei Chen, Nanilee Anantakul and Satanan Channowanna.

There are many techniques for doing this. Most include determining which spaces are information-oriented and candidates for sublimation. These physical spaces might be mediated to become cyberspaces for on-line usage. This sublimation would reduce the overall size of the physical building as outlined before. Once the students developed their program they created designs that incorporated the cyberspace as part of an overall building scheme. The options for this development can be explained by the Venn diagrams below (Fig.5). The two space types – physical and cyberspace – can be completely distinct, congruent or overlapping.

Many examples exist of *Distinct Physical and Cyberspaces*. The logical construct of a computer network rarely has anything to do with the layout of the building that houses it. In many cases relationship between the two is not necessary since the focus is on data and file structures rather than the support of navigable information space.

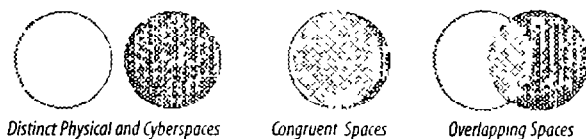
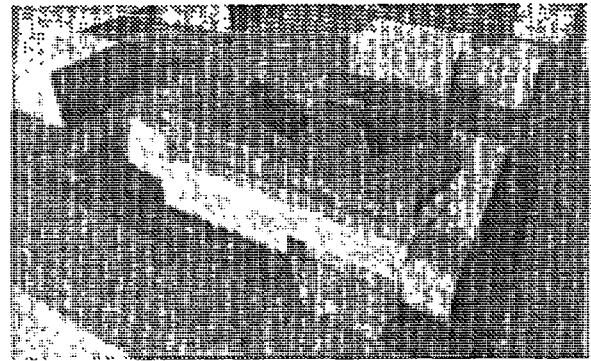


Figure 5

Examples of *Congruency* between cyberspace and physical space are seen in surveillance and monitoring systems. In these cases the building is mapped into a data base and linked to support technology through cameras and sensing devices. The one-to-one relationship of the cyberspace map to the building serves the needs of the surveilling party. The rigidity of the cyberspace model is characteristic of this congruency. If physicality determines the cyberspace configuration, the on-line architecture is necessarily more stable than otherwise.

The *Overlapping* relationship is currently seen in analog and digital forms. For example, many teleconfer-

encing and telepresence systems serve specific spaces in buildings. This is limited due to the expense and relative rarity of the technology. The space is perceived as a camera image and is usually not navigable by the viewer unless the camera is operated through remote control



Figures 6, 7: This art museum by Mark Mitchell used various viewing angles on the existing site to determine its geometry. Vertical surfaces were created by refracting the reflections from a pool through a hypothetical solid. The cyberspace of the museum, shown on the right, extends the surfaces of the building beyond its periphery. Cybereal additions to physical art displays would be accessible by the building occupants as well as those entering the facility from the Internet.

The cyberspaces designed by the students were typically less static than those found in conventional architecture. The designers wanted to convey the impermanence and subjectivity of these kinds of space. I encouraged them to examine the principles underlying the physical architecture and letting them inform the cyberspace configuration. There would be a geometric, conceptual link back to the physical architecture. But this geometry would only be the organizational skeleton of the building. Fixed room configuration would only occur if the cyberspace overlapped the physical. This overlap would happen if occupants of the physical space needed to confer with occupants of the cyberspace or if surveillance of the physical building were an issue.

With these underlying principles it would be possible to have a number of evolving solutions. We felt this approach was appropriate since spatial cyberspace could configure itself into specific forms according to the needs of the user. Once those users have left the space it could reform itself for others. The designers felt that cyberspace might constantly evolve while the physical architecture maintained an anchoring role.

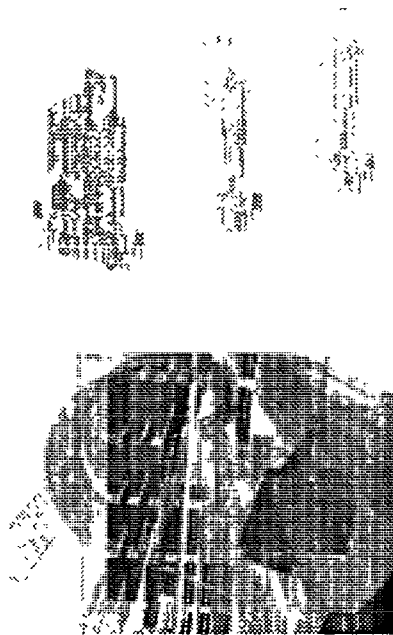
In several cases the students based their cyberspaces on the principle underlying their physical solution. Ranah Hammash's solution for a rare books library used the freeform geometry of her physical building to extend and orient the cyberspaces beyond it. Watinee Thantranon's design for a law library was almost entirely a cyberspace with specific reference to the Gothic architecture of the existing host building. [Figs 8, 9] In an art museum by Christopher Kretovic the vaults of the gallery extended into the ground plan to create a rough cylinder for a cyberspace extension.

Although the cyberspaces referred to the architecture of the physical buildings, these spaces often did not take the shape of conventional rooms. Students took advantage of the disembodied nature of the space by stressing information display over containment. An example would be rooms which existed as shards of information which took on depth when viewed closely – the way space is seen when looking through a prism.

Containment strategies were often employed in the design of social environments of physical and cyberspaces. The embrasure of the user and other occupants helped to set the stage for social interaction. Whether these enclosures took on conventional form was up to the designer. More important was the provision of a defined place of interaction.

Self, Society, and Space

The principles of architecture provide a grounding for non-physical space. They become referents and set the conditions of orientation. Cyberspace in this case is not a purely abstract space. Instead it is an extension of our present experience of the world. These structures help us to manage information. We are so immersed in this environment that we see it as our only reality. Instead, it is a sophisticated and powerful illusion – one basic to our sense of self, our place in the world.



Figures 8, 9: This law library by Watinee Thantranon exists almost entirely in cyberspace. Only the lowest part is an overlay onto an existing Gothic structure which houses a physical reading room. The cyberspace reconfigures itself for each user. While the organization of spaces stays the same, only some are apparent to each user, customizing the space for each use. The image on the left shows several configurations of the complex's cyberspace as seen from the Internet. On the right is a view from within the cyberspace.

This means that designers of cyberspaces must employ a cognitive understanding of space and information. The cyberspaces created by designers and programmers should acknowledge the user as the starting point for any design development. Cyberspace is an extension of our cognitive space. Denial of this undermines the role of computing as a medium for human interaction. Representational clues, like gravity and sunlight, orient us in space and engage us with the world. Even our imagined and dreamed spaces employ these devices in an implicit connection to physicality. This understanding is fundamental to developing sensory cyberspaces. Readers may refer to the works of Susanne Bødker and Brenda Laurel for more information on these issues. The human factors of computing are essential to the prospective design of on-line environments.

Spatial structures analogous to architecture can provide localized contexts mediating between specific data and the expanse of the Internet. These structures may be connected into larger wholes and higher levels of organization. An examination of MUDs and their effect on architecture anticipates the creation of useful cyberspaces – the seed structures of this larger organization.

Conclusion

Space makes engagement with information possible. More, it makes engagement of users with each other possible. The advent of graphic cyberspaces demands spatial strategies to assist in human interaction. This humanization of technology can be effected with the skills and training of architects and planners.

Ultimately cybrids can alleviate the loads on urban infrastructure, reduce our use of natural resources, maximize efficiency in the production in useful places of work and play. They exist at the boundaries of matter and media, fiction and fact. They can play a unique role in serving our information-based economy and culture, providing us with economical, flexible and unprecedented spaces

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Emergent Mind: Art in the Technoetic Dimension

In both art and science now, the matter of consciousness is high on the agenda. Science is trying hard to explain consciousness, with distinctly limited success. It seems to pose the most intractable of problems. For the artist, consciousness is more to be explored than to be explained, more to be transformed than understood, more to be re-framed than reported. As for conscious experience in itself, there is nothing we know more closely than our inner sense of being, and there is nothing we can experience with less comprehension than the conscious states of another. It may be that only the profound empathy of mutual attraction, "love" if you will, can break this barrier, but neither reductionist science nor the postmodern aesthetic could possibly countenance such an assertion. Fortunately there are signs that science is becoming more subjective and postmodern pessimism is on the wain. There is no doubt that both scientists and artists are curious about the ways that advanced technology can aid in the exploration of mind. And advanced technology itself is calling into question our definitions of what it is to be human and what might constitute an artificial consciousness in the emergent forms of artificial life.

I have recently introduced the term technoetics into my vocabulary because I believe we need to recognize that technology plus mind, tech-noetics, not only enables us to explore consciousness more thoroughly but may lead to distinctly new forms of consciousness, new qualities of mind, new forms of cognition and perception.

It is my contention that not only has the moment arrived in western art for the artist to recognize the primacy of consciousness as both the context and content of art, and the object and subject of study, but that the very provenance of art in the twentieth century leads, through its psychic, spiritual and conceptual aspirations, towards this technoetic condition. I need perhaps only point to the examples of Duchamp, Kandinsky, Klee, or Boccioni, early in the century, to indicate the roots of this tendency. It is equally clear that the impact on art practice of technology, especially digital and communications technology, has been to reduce art in many cases to a form of craft in which polished technique or skillful programming, leading to dazzling special effects, have come to replace the creation of meaning and values. A resonance with the nineteenth-century Arts and Crafts movement of William Morris springs to mind. There was then the same process of dumbing down from art to craft, in which the authoring of technique took primacy over the authoring of ideas, a pandering to the luxury market covered by a veneer of social conscience.

A more optimistic view is that our concern in digital art with whole systems, that is, systems in which the viewer or observer of the artwork plays an active part in the work's definition and evolution, represents at the very least a yearning to embrace the individual mind by a larger field of consciousness. By this account, the employment of telematic hypermedia is no less than a desire to transcend linear thought by reaching for a free-flowing consciousness of associative structures. It then becomes the artist's imperative to explore every aspect of new technology that might empower the viewer through direct physical interaction to collaborate in the production of meaning and the creation of authentic artistic experience. I would like to return to the theme of interactivity in art at a later stage since I see it as both emblematic of the desire for shared consciousness and problematic in its

assumed resolution of the object/process and observer/participant dichotomies.

But first, I want to address the notion of double consciousness and its relationship to art. By double consciousness I mean the state of being which gives access, at one and the same time, to two distinctly different fields of experience. In classical anthropological terms this is to describe the shamanic "trance" in which the shaman is both in the everyday world and at the same time navigating the outermost limits of other worlds, psychic spaces to which only those prepared by physical ritual and mental discipline, aided often by plant "technology", are granted access. In post-biological terms, this is mirrored by our ability, aided by computer technology, to move effortlessly through the infinities of cyberspace while at the same time accommodating ourselves within the structures of the material world.

To research this apparent parallelism between shamanic space and telematic space, and the double consciousness that seems to be a part of both fields of experience, I have spent time immersed in the virtual reality of advanced computer systems and in the traditional reality of a native Indian tribe, that is under the influence of the computer and of the plant, albeit an extremely powerful computer and a particularly potent plant (ayahuasca, the "vine of the soul"). My access to virtual reality was at locations on both sides of the United States, at the Human Interface laboratories in Seattle and at the University of North Carolina at Chapel Hill. My introduction to the psychic world was in the very heart of Brazil, with the Kuikuru pagés (shamans) of the Xingu River Region of the Mato Grosso, and through my initiation into the ritual of the Santo Daime community in Brasília.

The shaman is the one who "cares" for consciousness, for whom the navigation of consciousness for purposes of spiritual and physical wholeness is the subject and object of living. Consciousness occupies many domains. The page is able to pass through many layers of reality, through different realities. In his altered states of awareness he engages with disembodied entities, avatars and the phenomena of other worlds. He sees the world through different eyes, navigates the world with different bodies. In parallel with technologically-aided cyberception, this could be called "psi-perception". In both cases it is a matter of the double gaze, seeing at once both inward realities and the outward surfaces of the world.

The double gaze and double consciousness are related. In my experience of ingesting the ayahuasca I entered a state of double consciousness, aware both of my own familiar sense of self, and of a totally separate state of being. I could move more or less freely between these two states. Similarly with my body. I was at one and the same time conscious of inhabiting two bodies, the familiar phenomenology of my own body sheathed as it were in a second body which was made up of a mass of multi-colored particles, a million molecular points of light. My visual field, my double gaze, alternated, at choice, between the coherent space of everyday reality and a fractal universe comprising a thousand repetitions of the same image, or else forming a tunnel in space through which I could voluntarily pass with urgent acceleration. I could at any point stop and review these states, moving in and out of them more or less at will.

Many shamanic tribes not only enhance their psi-perception by drinking the ayahuasca on a regular basis, but their culture, by adoption, has given rise to a ritualized practice known as Santo Daime which has spread to most parts of Brazil, not least in its urban and metropolitan areas. In addition to the ritual drinking of the ayahuasca, Santo Daime has precise architectural and social codes. The design of the building that houses the ritual, the ordered placing of participants in that space, the rhythmic structure of the music, the pungency of the incense, the repetitive insistence of intoned phrases, punctuated by extended periods of absolute silence, the recurrent demand to stand or sit, one's own inclination to move into and out of the new field of consciousness that the ceremony and the drink together induce, leads one's awareness to fluctuate between the two realities. It raised the question, of course, of the way in which specific protocols and conditions control or construct a given reality, and leaves unanswered the question of where or how or indeed if a ground of reality might be identified or even be said to exist.

This immersion in a controlled environment, affecting sight, touch, taste, smell, and hearing respectively, conferring on the mind the ability both to induce and create new conceptual and sensory structures (in philosophical jargon new "qualia"), while at the same time giving the freedom to step aside from the visionary experience, back into the "normal" field of experience, is mirrored to an extent in our artistic aspirations using digital technology, as for example in Virtual Reality, hypermedia, multimedia installations and, with its superimposition of cognitive schemas on real world situations, the fast-developing field of Augmented Reality (see for example < http://www.cs.unc.edu/Research/stc/predictive_tracking_html/azuma_AR.html).

In both cases there is a kind of rehearsal of the Sufi injunction to be both in the world but not of the world, although the original context of that phrase is more emphatically spiritual than perhaps many artists would want to acknowledge. Here technology plays an important part in the experience of "double consciousness", just as it is clearly integral to our emergent faculty of cyberception and the double gaze. It is as if, through our bio-telematic art, we are weaving

what I would call a shamanic web, combining the sense of shamanic and semantic, the navigation of consciousness and the construction of meaning.

Historically our command of the material world has been such that we have little option but to keep the worlds of our double consciousness in separate and distinct categories, such as the real, the imagined, the spiritual. The advent of the Artificial Life sciences, in which I include both dry (pixel) and moist (molecular) artificial organisms and the whole prospectus of nanotechnology, points to the possibility of eroding the boundaries between states of mind, between conception and construction, between the internalization and the realization of our desires, dreams and needs of our everyday existence. Let me give you an example which can be found in our cyberception of matter at the atomic level. The scanning tunneling microscope (STM) enables us not only to view matter at this level, but to image individual, single atoms. However the real significance of this process does not end there. Not only can we select and focus on individual atoms, but we can, at the same time, manipulate them, one by one, atom by atom, to construct from the bottom up atomic structures of our own choosing. An aspect of this process can be viewed at the IBM website <<http://www.almaden.ibm.com/vis/stm/lobby.html>>.

This means that, in an important sense, the prosthesis of vision can be at one and the same time instrumental in constructing what is envisioned. To see in the mind's eye is to realize in the material world. The worlds of the double consciousness, supervenient as they are on the processes of the double gaze, become less distinctly separate. The immaterial and material lose their categorical distinction. Cyberception is as much active and constructive as it is receptive and reflective. As this kind of double technology develops, and it is doing so at an accelerated rate, artists, no less than the philosophers and neuroscientists, must increasingly turn their attention to what I will call "techo-qualia", a whole new repertoire of senses, and to a new kind of relationship between the tools of seeing and building.

Let me, at this point, return to the question of interactive art. At the moment, by its structure, placement and presentation (which is generally in a traditional museum or gallery space), the work of interactive art presupposes, in spite of itself, an audience of more or less passive observers, just as much as it proposes a participant in open-ended interaction with at its interface. In this sense, the total system including the participant viewer, however dynamic a process it may be, is actually incarcerated within the very status it despises, that of pure object – an envelope, bracketed in space and time, to be viewed by a second observer. This creates a dichotomy between the aspiration toward open-ended evolution of meanings and the closure of an autonomous frame of consciousness, a contradiction that necessitates the removal of the second observer and the phantom audience from the cannon of interactive art.

Here, by way of contrast, the shamanic tradition may usefully be invoked. All the activity of the page, and of those who interact with him in image making, dancing, chanting, making music, is performative but is *not intended as a public performance*. It is never played to an audience, actual or implicit. No one is watching or will be expected to watch what is being enacted. This is not a public performance but a spiritual *enactment*, which entails the structuring or re-structuring of psychic forces. To paint the body elaborately, to stamp the ground repeatedly, to shake the rattle, to beat the drum, to circle round, pace back and forth in unison, is to invoke these forces, to conjure hidden energies. This is an enactment of psychic power not a performance or cultural entertainment. This perspective, although seen at a great distance from our current hypermediated culture, may be of value in our consideration of the function of works of interactive art, thereby avoiding the double observer, the phantom audience. Art as an enactment of mind implies an intimate level of human interaction within the system which constitutes the work of art, an art without audience in its inactive mode.

Eschewing the passive voyeur, the traditional gallery viewer, this technoetic aesthetic speaks to a kind of widespread intimacy, closeness on the planetary scale.

So what then is the role of the artist in an art which increasingly sees its content and meaning as created out of the viewer's interaction and negotiation? An art which is unstable, shifting and in flux; an art which parallels life, not through representation or narrative, but in its processes of emergence, uncertainty and transformation; an art which favors the ontology of becoming, rather than the assertion of being; an art moving towards a post-biological re-materialization; an art of enactment, without audience. An intimate art, the free-flowing outcome of interaction between participant viewers within networks of transformation. An art, in short, which reframes consciousness, articulating a psychic instrumentality, exploring the mysteries of mind.

These are the questions which will take us into the next century and they are questions which artists working at the furthest edge of the technoetic aesthetic are already beginning to ask. One answer may be found in the deep past, in the remotest parts of the planet, or simply within the double consciousness to which we all have access. It may be found in the role of the shaman, re-contextualised in the bio-telematic culture but re-affirmed in its capacity for the

creation, navigation and distribution of mind. It may be as the conservator of what emerges from the complexity of interactions in the Net or from the self-assembling processes of artificial life. Whatever may be the case, one thing seems certain, the technoetic principle will be at the centre of art as it develops, and consciousness in all its forms will be the field of its unfolding

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Post-Urban Cities

Post-Urban Cities is a work in progress. Its first product is a hybrid CD-ROM that interfaces with the Internet. It is a result of a reflection about a project of Urban Intervention, *Arte/Cidade* (<http://www.artecidade.org.br>), curated by Brazilian philosopher Nelson Brissac Peixoto, that has been taking place in São Paulo since 1994.

Arte/Cidade explores the relationships among art, architecture and urbanism, through interventions in abandoned buildings and forgotten circuits of the city. Its point of departure is the vision of contemporary metropolises as communication and transport networks, punctuated by discontinuities and fragmented lines [Fig. 1].

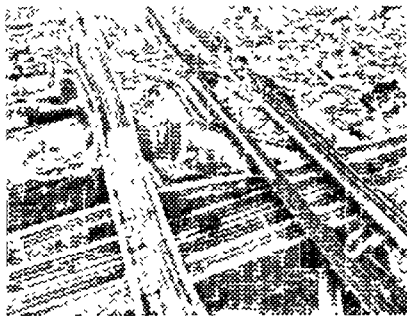


Figure 1: Aerial View of Brás neighborhood, intervention site of *Arte/Cidade* project, São Paulo, 1997. By Cassio Vasconcellos

Artists and urbanists are invited to create artworks for those specific locations and urban situations. Because of this, a CD-ROM about *Arte/Cidade* is a paradoxical object. It is made through the impasse provoked by the incompatibilities between the scale of content and that of its own means of conveyance.

To the difficulties of the reconstruction of artwork that depends on their setting and on the experience of the observer, is added the difficulty of dealing with those specific locations in an abstract and virtual space, a non-place by definition [Fig.2].



Figure 2: Image from the CD-ROM *Urban Interventions*, 1997. By Ronaldo Miranda

The relationship between the site and the non-site shall never be that of a mere register, a representation of what happens in the intervention space. The non-site is a sort of map made of fragments whose intention isn't to rebuild the intervention that happened in the place. The site remains inaccessible and the non-site keeps it undetermined and contradictory aspect.

The idea of a CD-ROM with on-line interface stresses those contradictions. It reinforces the tensions between the hugeness of the urban situation, its passage into the two-dimensional surface of the CD-ROM and the endless of cyberspace, where post-urban cities proliferate, transforming the interface into the message.

Those aspects led us to the limit of the question of intangibility of space and put post-urbanity on the horizon of *Arte/Cidade* project. Alien to time fuses and independent from the concrete effectiveness of human relationships, the post-urban cities emerge confined by areas of internal flux, but they don't circumscribe landmarks.

This impossibility of location on the geological and geographical ground does not imply a non-location, but in a non-topographic topology. A topology that is inscribed in the displacement of an information network, and affords the creation of points of intersection.

It is precisely in these intersections that live the post-urban cities. And they are not "post" because they chronologically succeed the urban thinking, but because at the same time that they subvert our basic idea of city, they are conceivable only within the urban horizon [Fig.3]

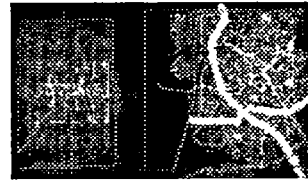


Figure 3: Image from the CD-ROM *Urban Interventions*, 1997. By Pipa

They are not confined to the cities ranked in the Internet's traffic lines, although they are prolific there, where an unmeasurable amount of data streams per second, of which a significant part still offer free or low cost access. They are dematerialized cities that redirect the vectors of this end of the century's utopias, enabling schemes where interchanges draw non-territorial maps of intelligent communities.

In this kind of scenery are being placed the bets for a different sort of geography, one that could reshape the very meanings of geography and history. It is sceneries like these that make us think about the wealth slumbering among the ruins, where everything is unheard-of, and at the same time known; everything is dead, and yet unborn [Fig. 4].



Figure 4: Ruins of Indústria Matarazzo, São Paulo, intervention site of *Arte/Cidade* project, 1995. By Nelson Kon

Here one can think of post-urban cities and their imaginary landscapes. Cyberspace cities, that must not be confused with the electronic superhighway's "double perverse," as Pierre Levy named it, because "it puts on stage a territory (the physical networks, the token services), instead, and in the place of, common objects."

These common objects are basically virtual, temporary constructions that result from the sharing of memories and of hypertexts that in their absolute contemporaneity update the meaning of the ruins.

Ruins are more than abandoned places; they are the exposed scars of a past without continuity, one that obstinately insinuates itself as a chance of future. Places that have lost their physiognomy, and therefore become readable in spaces that defy the rationale of urban planning, that undepend of mark and territory references.

That is what puts cyberspace on the operational horizon of *Arte/Cidade*'s projects of intervention in abandoned buildings and empty spaces. Likewise going around metropolises, navigate on the network to get in the center of a displacement structure, starting from the idea of discontinuity.

A discontinuity that is made by the reframing of scales that are no longer measured in kilometers or miles. A motion that doesn't happen in an invariable way, according to the laws of mechanics. A kind of displacement that operates the interaction existing between the poles of the physical city and the cyberspatial city, through connections that can revalidate the concepts of authorship, nationality, and city [Fig. 5].

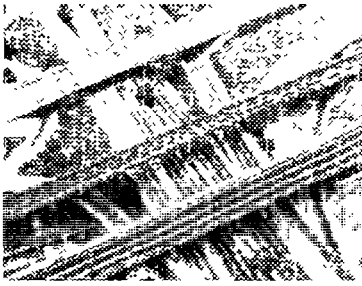


Figure 5: Aerial View of Brás neighborhood, São Paulo, intervention site of *Arte/Cidade* project, 1997. By Cassio Vasconcellos

Intelligent collectivities, where the “link,” the point where hypertext becomes effective, the place where encounters happen through “elective affinities,” that’s all. Because it is at this moment that memories are shared, that files from various origins are reread and recycled. It is from there that post-urban cities can be developed. Where particular histories overflow their specifics, drawing the mesh of a borderless community, made of gaps and random encounters. “Crash communities,” points of intersection, recomposing differences, articulating instabilities, routes of collision and implosion [Fig. 6].

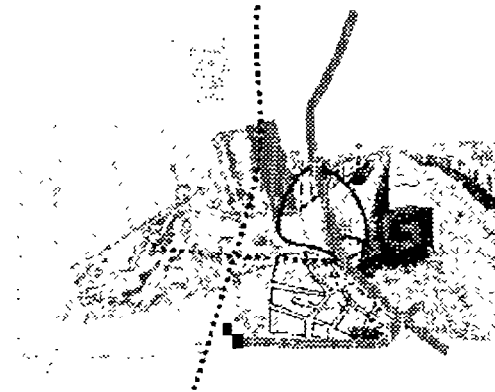


Figure 6: Image from *Arte/Cidade* web site, <http://www.artecidade.org.br/brasmitte>, 1996. By: Ricardo Ribenboim

The project is essentially deconstructivist. It doesn’t intend to reinforce the cybernetic nonsense of virtual pseudo-cities that emulate the most boring aspects of Western cities: banks, malls, peep-shows. It is related to other vectors: those that indicate a new geopolitical configuration, a network that is not linear as the railroad paths along which 19th century metropolises have developed. A network that is a global web made of random and temporary connections, that revalidate the senses of pertinence and of distance, intrinsic matters to the very notion of contemporary urban spaces as navigation environments. A navigation that does not guide itself through a magnetic compass, as did the 16th century’s great navigations, which transformed space in a net of imaginary lines where routes were traced with points of departure and arrival.

It is a navigation performed without a precise sense of destination, as in a links’ research, of on line addresses that can shelter sites, debate lists, or chats, that connect individuals and groups around common and temporary spaces. Not the vision through a telescope, monocular as the experience of classical perspective, but that of multiple windows of the computer environment and of frames’ programming, that disarticulates language and transforms images in landscapes, figuring the equivalence of project and ruin.

The megapolises’ abandoned buildings are exactly like that. In one only structure, the intuition and its impossibility. and, in what concerns the interventions that have been taking place in the city of São Paulo, they force the encounter with greatness and with horror. [Fig. 7].

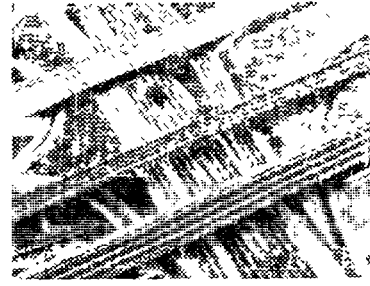


Figure 7: Ruins of Indústria Matarazzo, São Paulo, intervention site of *Arte/Cidade* project, 1995. By: Nelson Kon

Because there the matters of scale are related to the unmeasurable, to what escapes to the intention of understanding and arrangement. From the poverty that spreads under viaducts to the tumpikes that overlay the urban tracks, everything in contemporary megalopolises compels to a broken displacement, the recognition of socially and spatially interposing barriers.

Urban ruins become, then, more than a testimony of our political unfitness. They are the parenthesis between two eras: a present-of-the-past and a future-of-the-present. It is between these parenthesis that are set the impasses of post-urban cities: the globalization of poverty and the prospect of the world’s dematerialization [Fig. 8].



Figure 8: Image from the CD-ROM *Urban Interventions*, 1997. By Pipa.

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Memory is the Message

Today, innovations in digital technology seem to have created a new and imaginary world of virtual reality. But I want to argue this is not so, and that virtualization is in fact a biological skill unique to all humankind, and it helps us to deal with the real world — being employed from the earliest pre-technological cultures down to our own technology-saturated ones.

Our ability to virtualise things is not technology dependent nor is the process derived from technology — it is an absolutely fundamental part of our biology, one that we have transported into various artificial technologies.

Whoever put the words “virtual” and “reality” together must have enjoyed creating this impish paradox. For virtual sex will likely be as available and preposterous as real love is fulfilling and elusive. And it is the latter we must relentlessly pursue.

Let me try and reassess this by looking at two things — the virtual, and its twin partner, the actual. Simply put, something that is actual exists at this moment in time and in this space, here and now. The same thing made virtual is it in essence, so being transportable through time and through space. But both are real — one thing existing in two forms.

These two, the actual and the virtual, are dynamically linked. We constantly transform the substance of things from one state to the other, like late 20th century alchemists — the actual we virtualise then later re-actualise — employing both biological and digital memory to do this. So we have developed

the ability to multiply and transport our memories to be used by many people in many places at many times. An understanding of the way we employ virtualisations in biological and digital memory is essential as we start to shape the new Cyber Age.

Our own ability to perceive things, anything, rests in a coded virtualisation lodged somewhere in biological memory. But we now seem to take our ability to remember things for granted — that is unless we forget something. Without the ability to virtualise things into memory we would in fact perceive no more than each disjointed second of our isolated existences; we would have no history, no language and no culture to share.

Let me give a practical example of biological memory's power to virtualise things without even having to try and without knowing what it's doing in us. Let me ask you the following question: How many doors are there in the house you presently inhabit?

Well, it's likely that you do not have an immediate answer to this question—possibly because you've never stopped to count the number of doors in your house. But, let me ask you the question again and, this time, close your eyes and try to compute the answer. So, how many doors are there in the house you presently inhabit?

With a little time to reflect you will each be able to answer the question correctly, and do so by re-actualising the landscape of your home stored as a virtual memory and taking a walk around it to count each door until the correct total is found. This is an example of the actual made virtual, then reactualised in biological memory so to be at our service. And the process by which we are able to do this makes a number of facts obvious.

Firstly, through experience, and without even trying, our biology virtualises things, forming an internal representation of what something looks like.

Secondly, the subsequent re-actualisation of this in memory creates a strong representation that can last for very long periods of time.

Thirdly, it is an accurate representation.

Fourthly, we can re-actualise the image at will from amongst the billions of memories we carry within ourselves.

Finally, once re-actualised we can navigate and move around this virtual space in any direction we choose in order to retrieve knowledge.

Without knowing it, we all carry within us such virtual landscapes through which we could navigate, if we still knew how, in order to explore knowledge. They are, though, the territory of individual space not communicable to each other without the invention of techniques or technologies to re-actualise them in a form that is transportable outside ourselves and between people. And this process is crucial to the making of a culture through which social cohesion is created between individuals — or, if misused the subjugation of individuality to collective goals.

Speech is an actualising technique that is variable and, say, charcoal an actualising technology that is stable. They both serve to transport things from the virtual landscape of individual memory into the territory of public domain, so to be shared. Indeed, the last 500 years or so has seen spectacular progress in the invention of technologies specifically designed to transport our memories from the private domain into the public — as clones identical to each other in every way. From speech to radio — from stylus, wax tablet, papyrus, vellum, paper, pen, ink — to type, printing, books, cameras, photographs, videos, TV and CD-Roms, — all techniques and technologies designed to re-actualise, standardise, multiply and distribute our virtual memories — this with the specific objective of creating social cohesion amongst us.

And this journey beginning in the ancient world with the design of human memory, has reached a watershed in our post-modern world with the emergence of its surrogate, digital memory. This intertwined relationship of our biological memory to our technological memory and how we use them to virtualise and re-actualise things is a crucial one that has a common thread running back through the generations. It first raised a debate when the methods of oral cultures were augmented by a new technique supported by a new technology — that of writing with pen and ink on a stable base. Only one person living at this precise moment in history was able to perceive the shift. Typically, though, Socrates committed nothing to writing himself — relying on his young pupil Plato to do so. Famously, in the *Phaedrus*, he records Socrates's suspicion of writing, which he believed would place outside the mind that which should rightly be within it. And he has Socrates say in the *Phaedrus* that the effect of this upon us would be threefold:

- 1) We would lose our memories;
- 2) We would cease to be private individuals;
- 3) We would change the way we educated ourselves.

Well history has proven Socrates right on each of these counts, and no more so than at the present. This shift, induced by the first technologies, progressed at great speed in a very short space of time, and our memory system has not yet caught up or we taken time out to reflect. Indeed our memory structures are influenced by the way we use available technologies in order to live with each other. In earlier oral cultures this was not so, simply because they were without writing and technology. Indeed, the invention of printing from movable type has had such a profound effect, we tend to forget that book culture is in fact a very recent invention — that only about one third of it has been typographic and that the greater part of human history not only predates modern technology, it even predates writing. It is perhaps wrong to assume that book learning, the only sort we know, has always been the dominant mode, and that such metaphors provide the only model as we move into a new Cyber Age. So we must catch up after a long period of stability in the old world — this "Folk Age" — and rapid change over the last 500 years in the "Machine Age."

These three epochs, the "Folk Age," the "Machine Age," and the "Cyber Age," embrace various cultures similar in the balance they strike in the use of biological and technological memory systems.

Broadly, I would define the "Folk Age" as all those cultures using individual human memory as the primary means for storage and conservation of knowledge. In the earliest of these (ones before the invention of writing) what could not endure in the memory of each person, evaporated completely and was lost. Histories, ancestries, stories, and journeys all had to be conveyed by the spoken word in order to forge social groupings with shared cultures that could endure over successive generations — so they struggled to create social cohesion in a world full of individuals and tribes.

So special people were identified as the keepers of knowledge. Their role was to inculcate standard narratives into the memories of people, and in doing so, binding them together by a common thread. This was the job of shaman, preachers, minstrels, and storytellers of the time. They had to invent techniques to assist this process of virtualisation and re-actualisation of knowledge, and they had to design their own human memory systems and aid those of ordinary folk.

In these early oral cultures of the "Folk Age," ballad, poems, and stories were the chief strategies used to make things easier to virtualise. People of the "Folk Age" were also able to re-actualise such knowledge from memory in a non-linear fashion. Unlike us, they were able to manipulate sequence and order at will. For example, the following extract refers to a journey through a landscape that has both an actual and virtual existence. It is a map in the form of a song, in which an old Nootka woman explains how her ancestors navigated their canoes in the search for food—the very last line being significant:

"Everything we ever knew about the movement of the sea was preserved in the verses of a song. For thousands of years we went where we wanted, and came home safe because of the song. . . . There was a song for going to China and a song for going to Japan, a song for the big island, and a song for the smaller one. All we had to know was the song, and we knew where we were. To get back, we just sang the song in reverse. . . ."

Though such early oral traditions of the "Folk Age" were entirely memorial, the manuscript cultures that succeeded them were essentially so. The practical difference being that oral traditions relied entirely on variable techniques for the conservation of their memories (i.e., ballads and poems) whereas manuscript cultures augmented these through the application of more stable technologies (i.e., writing with pen, ink, and parchment). This said, they both still operated from the premise that knowledge was to be virtualised into, and then re-actualised from, biological memory. In these cultures books and manuscripts were considered as aids to memory rather than its substitute outside the mind. They were specifically designed to assist the process of virtualising things into memory in a way easy to later re-actualise. And the ability to do this, again and again, in any sequence, backwards, forwards, randomly, remained a highly prized skill in these cultures.

So it was not intended by the designers of manuscripts that their prime function was to freeze knowledge between the bindings; no, manuscripts contained aids to memory with their contents being designed in a form easy to virtualise and re-actualise, with biological memory being considered its ultimate place of conservation. Manuscripts were medieval "Power Books" intended to shape the collective memory of people.

Though cultures of the "Folk Age" were able to re-actualise and share memories between people these were still subject to dynamic evolution. Stories once told, remembered and then retold, would mould past memories with current knowledge to create new perceptions. And though written manuscripts took a first step towards the standardised distribution of memories they were still limited in number and they varied in content with the writing of each new edition.

This all changed in the "Machine Age," whose cultures were similar in their ability to actualise our memories as concrete substitutes outside the mind of each person in ways that could be cloned, multiplied and distributed widely in an absolutely identical form. The "Machine Age" starts with the invention of printing from moveable type. Through this widespread distribution of standard narratives, the "Machine Age" saw the rise of literacy and the advent of collective memory. This started the

suppression of visual language in our culture, and the crucial role it had played in helping individual people to virtualise things into their memory.

It was Victor Hugo who observed that the invention of the printing press at the end of the Middle Ages killed the building as text — that the wall of a cathedral, for example, no longer had to illustrate the Bible, if people could read its stories in book form.

And this gradual loss of our capacity to handle visual language resulted in a progressive erosion of our ability to design and manage human memory, which is absolutely reliant on our ability to manage images. So books, photographs, videos, and other artifacts of the "Machine Age" gradually became the actual substitutes for memory outside the mind of each person.

The invention of photo-lithography at the start of this century accelerated the condition, through the mass production of increasingly sophisticated visual images that saturated our culture with frozen memories, these fossilised fragments of history — and this as literate communication had finally eroded our control of visual language. The condition was first observed in 1964 by Marshall McLuhan in *Understanding Media*, where he said:

"Highly literate people cannot cope with the nonverbal art of the pictorial... The unconscious depth-messages of ads are never attacked by the literate, because of their incapacity to notice or discuss nonverbal forms of arrangement and meaning... The fact that typography is itself mainly subliminal in effect and that pictures are, as well, is a secret that is safe from the book-oriented community."

So the "Machine Age" evolved a culture supreme in its ability to externalise knowledge through the fragmentation, freezing, packaging, and distribution of our memories outside the mind of each person — these being actualised and cloned in the mass produced artifacts of our culture: its books, photographs, films, videotapes, and CD-Rom's. These artifacts, no longer being memory aids, but its actual substitute outside the mind of each person. This eroded our control of visual language, and subsequent ability to design and navigate biological memory. Leaving us free to forget of the need to remember, it has created a form of collective memory in which people must strive for individuality, personal coherence, and freedom of will.

Though the capacity to design and navigate biological memory remains alive within us, the incentive and will to use it has been appropriated by external agencies, the heritage and advertising industries and political regimes of today. They now use the power of fossilised memories — these frozen visual images — to construct fictional histories and bogus narratives within our collective memory. As our memories have been transported outwards so Big Brother has moved inwards to colonise the space that is left. And this process has been aided by an intellectual power game — the "fractured mirror" of a post-modern world — which subverts each person's ability to construct a coherent landscape in memory, a coherent self. This condition being predicted in the following poem by Jorge Luis Borges:

*"These odds and ends of memory are the only wealth
that the rush of time leaves us.
We are this chimerical museum of shifting forms
this heap of broken mirrors."*

Our post-modern world seems to accept such a fracturing of identity as inevitable, and when linked to current views that the non-linear format of digital culture on the Net will see the dissolution of narrative, then Aldous Huxley's *Eyeless in Gaza* might seem accurate. In this he likens our memories to snapshots in the mind, saying:

*"Somewhere in the mind a lunatic shuffled a pack of snapshots and dealt them out random,
shuffled once more and dealt them in a different order, again and again, indefinitely. There was
no chronology."*

As the digital cultures of a new "Cyber Age" begin to shape themselves, there is much we can learn from these preceding epochs. Throughout them both, we have seen a consistent drive to invent technologies that freeze and externalise our memories outside the mind of each person in ways that can be shared, so creating social cohesion between people and cultural continuity between generations. This is the making of culture through the creation of collective memory — it is an honourable and necessary quest. But, since the invention of our first memory technology (writing on a stable base), the pendulum seems to have swung dramatically from one end of the social spectrum to the other. Indeed, whilst supreme in technological progress we seem to be inadequate at matching this with appropriate sociological innovation. Technology is in itself neither good nor bad — it's how we choose to employ it that matters. We should now be well placed to balance the pendulum of the new "Cyber Age" between the lessons learned from these conflicting but necessary tendencies of previous epochs.

In cultures of the "Folk Age" the predominance of biological memory systems created virtual landscapes of knowledge within the mind of each person, their memories being flexible and dynamic, able to be navigated in a non-linear way. Because of this, though, they struggled to create order in

society and social cohesion in a world full of individuals and tribes. In cultures of the "Machine Age," technological memory became supreme in its ability to externalise knowledge through the fragmentation, packaging and distribution of our memories outside the mind of each person. Here memories become fossilised artifacts, so losing their dynamic organic form and only retrievable in a linear fashion. Through this form of collective memory, though, social cohesion and order has been created though ordinary people have to struggle to assert their individuality and freedom of will.

Between these two epochs we now have an opportunity to construct a balanced culture for the new "Cyber Age" — one that bridges the gaps between individual and collective memory and re-establishes the power of visual language alongside that of literate communication. One that combines the wisdom of ancient cultures with a wise application of artificial memory technologies. One that recognises the multiple aspects of ourselves within a single coherent identity and knows that whilst master narratives will be replaced by many narratives there will always be stories. In this challenge we should be mindful of the warning from Socrates that technology placed outside the mind that which should rightly be within it, causing us to lose our memories, ceasing to be private individuals, and so handing the power to educate ourselves over to the bogus narratives of others.

We must re-sensitise ourselves to the power and flexibility of our own human memory system. We must repossess it, and re-establish our natural ability to virtualise things so to again navigate our own landscape of memory. In this sense "Cyber Space" is really "Psychic Space" — the landscape of memory made visible by technology and globalised. In doing this we must shed our inheritance from a more recent "Machine Age," taking care not to elevate our technology over our biology, and extending the metaphors of this dead "Machine Age," which advocated the "Medium as the Message," and all technologies as ever outward extensions of the human body. In this sense it is wrong to suppose that digital memory is a substitute for human memory. There is a world of difference: digital memory shifts information, whilst biological memory manipulates meaning. And, in the latter case, the construction of meaning is a flexible and dynamic process of mind — virtualised internally by human beings as they mold past memories with current experiences to create new perceptions and beliefs.

Digital memory is more akin to biological memory than any previous technology, so we have an opportunity to create a unique amalgam from the two. And in this we have much to learn from the memory traditions of oral and manuscript cultures of the "Folk Age," from their shaman, minstrels, and storytellers. Indeed it is likely that opportunities offered by digital networks will be most readily grasped by those countries retaining essentially oral cultures — in Africa, India, South America, and Eastern Europe.

And we must learn from Borges and Huxley to beware power games that seek to fragment our memory as a heap of broken mirrors, to be shuffled and dealt randomly by some lunatic until there is no chronology. In this we must not forget the one thing that makes us absolutely unique amongst all living things — whilst all other living organisms have a past, only we have history. Only we have the ability to create memories and structure them as narratives in a way that can be shared between us, creating individual identity and social cohesion. And, finally, in revisiting and revisioning McLuhan, we must now understand that the memory is the message, not the medium by which its conveyed.

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Sammy Spitzer

At the Edge of DreamLand:

Media Encounters in Architectural Venues

keywords: situated media, very distributed storytelling, sensors as interactive input, transcultural icons as narrative, society of audience.

The Dream Machine is a collaborative, interactive work currently under development by the MIT Media Lab's Interactive Cinema Group. *The Dream Machine* project focuses on the creation of a highly-distributed narrative presence which spans and interconnects several widely-differing modes of presentation and involvement, including: the World Wide Web; a network of pagers and pager-like "smart badges"; and large-scale multimedia installations situated in "live" architectural spaces throughout

the world.

The Dream Machine explores and expands the techniques of cinema, live performance, magic, sculpture, and architectural space design to craft an emergent story experience in close collaboration with its audience of “co-actors.” Interpersonal communications are enabled and enhanced as participants (either as individuals or groups) shape and navigate their way through personalizable, information-rich environments and dynamically adaptive, emergent stories. Audience involvement is designed to be playful, lyrical, intuitive, conversational, and improvisational. Social and narrative meaning emerges through interactions with:

- Interesting transcultural characters, locations, and situations;
- Personal dream creation, submission, processing, presentation, and interpersonal bartering;
- Information ecologies, geologies, and geographies.

In this paper, we focus primarily on the purpose, structure, technology, and content of Live Sites situated in architectural spaces. Arrays of “fuzzy sensors” (such as sonar, radar, and electromagnetic field detectors) alert the system to the presence and activities of passers-by; large-scale rear-screen projections and sophisticated audio playouts respond dynamically to the signals from these sensing devices, orchestrated by Isis, a new stream-control language.

Purpose

The Dream Machine project grows out of the desire to explore a grammar for interactivity which takes the network’s global nature into account. In defining the constraints for this work, we seek to investigate the nature of emergent narrative systems which invite their audience to engage in a complementary process of making and participation. In these systems, meaning is not pre-constructed. Story emerges over time, steered by sequential interactions with one or many people. As information flows, the information itself exhibits idiosyncratic behaviors, timing, latency, and catalyzing effects. Meaning is conferred by temporally disjunct associations and interactions. The system must respond to history.

The Dream Machine project builds upon traditions of life as well as of cinema, theater, architecture, and computation. It exists on the network and in a series of Live Sites. Designed to offer compelling “out-of-the-box” experiences in a live architectural setting, large-scale video is interactively projected into a sensor-rich “responsive space” which desires to startle and surprise the innocent passer-by with fragments of memory, temporal collages, images as if from a dream. Walking down the street, we smell a rose; look, there it is; we know it but cannot take it with us.

Where should this place of encounters — “the Edge of DreamLand” — be situated? In a busy hallway... a place through which one passes to get somewhere else? In a colonnade? In the window of a mall; at MIT; in Chicago, or Shanghai, or London? We connect via a global network, but we are still physically present in a particular place at a particular time. The story evolves in both the diffuse geography of the network and our architectural surround in space; metaphoric mappings and behaviors acknowledge the connectivity between them.

Background: Situated Media and Modes of Interaction

Situated art reveals its meaning in part through the work itself and in part through its physical and symbolic surround. Typically, an artist will use “found” history or a topical situation of a place to extend the meaning of a work, either metaphorically or literally.

In his final work, *Etant donnés: 1° la chute d’eau, 2° le gaz d’éclairage* (Given: 1. *The Waterfall*, 2. *The Illuminating Gas*) (1946–1966) — which is on display at the Philadelphia Museum of Art, Marcel Duchamp creates a complex web of meaning by situating his work in a museum. To Duchamp, father of the ready-made, the museum stands as an art cemetery, a place where the current ideas which drive art creation languish and the art object becomes an antiquity. To the uninitiated who arrive at the old door encased in masonry by way of the main gallery spaces, there is an odd sense of having entered some “behind the scenes” part of the museum. Indeed, if no one is in the room to guide them to the two small holes in the wooden door, the uninitiated viewer may leave as they entered, never viewing the final, erotic *mise-en-scène* whose perversely symbolic narratology is composed entirely of ready-mades.

In *Dream Machine*, we seek to connect the participant with a sense of global space. Scenarios played out at the “Edge of DreamLand” can reflect common culture, as in the flight of pigeons; local culture, as in a South Boston stoop or a model decked out in a Media Lab wearable-computer fashion; or global culture, as in an Indian Dancer performing on a collage of images from the WWW. How does the meaning of these scenarios change as we move “The Edge of DreamLand” to other locations around the globe? As we grow our collection of scenarios for situated space, we can begin to orchestrate commentary by association and contrast. We walk along a colonnade; our motion alters the architectural perspective; we see a court yard with pigeons. Some time later, perhaps in a different

location, we see a courtyard up close; pigeons are feeding; we approach and the pigeons fly away; we leave, and they return.

Several earlier pieces built in the Interactive Cinema Group explored the ideas of architectural place and human connectivity. In 1987, we developed *Radio Interference* in collaboration with the Antenna Theater troupe. In this work, the setting was minimally reactive; it was the human actor who saved the day, leading participants through the theatrical experience of particular scenarios. In this carnival atmosphere, only the *Proximity Pieces* waited without fanfare for someone to pass by and trip an invisible IR sensor. Instantly, an adjacent monitor came alive in the dim light of the Media Lab Cube; a face turned quickly toward the startled passer-by. “Bet you left your keys in the car,” he said: invariably, the now anxious visitor quickly patted her pants pocket to check.

Perhaps more self-consciously, *The Wheel of Live* partnered an explorer and a guide from the waiting audience. As the explorer made her way through a physical landscape of opportunity and fantasy, the guide transmitted timely messages which revealed potentialities for interaction. Once again situated in the Media Lab cube, this work suggested that structured human human duets across a network could be engaging so long as the participants understood the consequence of their actions and experienced a payoff commensurate with the narrative effort. More recently, in *Sleep Deprived*, Freedom Baird explores the implications of a technologically-mediated duet with a virtual character.

In situated work, the physicality of interaction invites us to play with “fuzzy” measures of time, scale, and meaning. How long does it take us to pass a display; what are the synesthetic boundaries of our response; how do we internalize the experience? The opportunity to detect, measure, and moderate individual responses brings us full circle to the network presence. As an uninitiated passer-by experiences surprise or captures a memory, this transformational consequence signals a shift in the state of the network itself. The architectural place can now be thought of as an extension of the ganglia of the diffuse network; or the reverse, the network itself can be considered an extension of physical place, a satellite of the world whose bag of addresses and messages is in a state of dynamic flux.

Out-of-the-Box Experience: Structure, Technology, Content

Collaboration builds on an initial vision and the circumstances of participation. Over time, collaborative work shifts and grows, dancing to the tune of multiple contributors. What comes first: the vision, the architecture, the content? In the case of *Dream Machine*, the desire to play with large-screen projections in casual architectural space was empowered by the creation of *Isis*, a media scripting language currently under development by Agamanolis at the Media Laboratory.

As the geography of *DreamLand* emerged, a hallway bounded on one side by a glass wall — which is now covered with a large-scale rear-projection screen — suggested itself as “The Edge of DreamLand.” Combined with an array of “fuzzy” sonar sensors used to detect human passage and activity within the space, the “Edge of DreamLand” becomes a transitional space which reveals itself to people hurrying by from either direction. How shall we map consequence to such a space? The challenge of creating interactive experiences for this enhanced architectural passage strains the imagination. This is not a place to stop and perform: it is a familiar and functional place one normally passes through on the way to somewhere else. That preconception about place provides us with an opportunity to surprise and delight by offering people a chance encounter, triggered by entering the purview of a non-contact sensor. This is a place where scale of time and scale of space matter. Like passing by the Hancock Building and watching ones image ripple on the glass, or walking up to the Forbidden City, there is a closeness here which provides us with insights into interactive grammar.

What should happen at the edge of DreamLand? Something believable. Something revealing. Something that gives the passer-by something that they did not have before. In a series of experiments in our Lab this summer, Sammy Spitzer developed the notion of *Street Encounters*. In one such encounter, as the casual passer-by walks down the hallway she sees pigeons feeding. Just as she moves in parallel to the frame of the projection screen, the pigeons are startled and fly away. After a moment, the flock returns, as pigeons are wont to do. Visually and kinesthetically, this piece surprises. In an act of agency, we disturb a representation of living things whose real nature is known to be skittish. In this piece, Isis responds to a simple serial signal from the first sensor in the array: a “trip-wire” approach to interaction.

Jayshree, an encounter with a classically-trained Indian dancer, relies on a slightly more complex monitoring of the sensor array. As the passer-by strolls down the corridor, a small image of Jayshree scans the hallway, looking for her audience. As the passer-by enters the space and trips the first sensor, a full-scale Jayshree symbolically applies her make-up and begins her dance. Woe to the passer-by who walks out during Jayshree’s performance: her larger-than-life head turns to glare angrily at the departing pedestrian, then fades and shrinks to nothingness. While the interaction in this piece remains simple (two trip wires and a knowledge of the direction in which you are exiting the space), Agamanolis has expertly scripted the experience in Isis using the image-processing primitives of positioning, scaling, and transparency. The way in which Isis supports various levels of authoring abstraction and of user expertise makes this language ideal for large collaborative ventures. Using a

single language base, creators may script complex animations and behaviors using high-level constructs; or, they may write drivers for in-house sensors and otherwise hack low-level system operations. The small yet complete syntax of Isis lessens the burden on novices while allowing experienced programmers to take full advantage of their skills.

So far, we have experimented mostly with a trip-wire approach to scenario interaction. However, several pieces now in development will use a lateral follow-motion to create a shadow play with the motion of the participant. Scenarios such as *Girl Revealing Toes with a Flashlight*, remind us of the well-known "disclosure sequence" in Flaherty's *Moana*: only after showing us several repetitions in close-up of a boy's arms around a tree trunk intercut with his feet jumping up the trunk does Flaherty pull back to show us the enormous height of the palm tree.

Rediprocity and Interconnection: Highly-Distributed Interactive Opportunity

One central goal of the *Dream Machine* is to interconnect a very distributed society of audience by means of a robust, dynamically adaptive narrative entity. This means that shared aspects of the world must be communicated among several widely-separated sites, and that information about activities and changes at each site must move within and between participant worlds. Emergent narrative requires both a grammar and an engine for driving story setting, character, activity, and history.

As we construct our very distributed story world, we are focusing on two particularly useful types of information-moving engines. The first, called *Happenstance*, is flexible storytelling testbed which expands the literary and theatrical notions of "Place" and "Situation" to accommodate interactive, on-the-fly story construction. Important aspects of story content and context are made visible, tangible, and manipulable by systematically couching them within the metaphors of ecology, geology, and weather. Information-rich environments become conceptual landscapes which grow, change, and evolve over time and through use. Current information follows a natural cycle modeled after the Earth's water cycle. Older information, history, and complex conceptual constructs, built up by the flow of data over time, are manifested in the rock and soil cycles. Directed inquiries, explorations of theory, and activities associated with the audience's personal interests are captured and reflected by plant growth. As a result, information itself is imbued with sets of systemic, semi-autonomous behaviors which allow it to move and act intelligently within the story world and other navigable information spaces.

The second engine, called *Groove*, is an experimental client-server prototype which does "air-traffic controlling" of objects, properties, state changes, and other vital narrative information as it flows between sites. A detailed description of this architecture will be the subject of a later paper.

Conclusion

"The Edge of DreamLand" encourages us to ask, what does it mean to situate a media projection in a hallway where a passer-by disturbs or changes the course of a narrative? How can granular content be structured to communicate meaningfully in brief, unanticipated encounters? What happens to the notion of "author" in these spaces, where the audience plays an active role in the co-construction of narrative meaning?

In my Fall course, *Workshop in Elastic Movie Time*, several student teams are developing their own scenarios — and their own sensate canvases — for "The Edge of DreamLand." By December 1997, the situations, characters, and activities they create will be inextricably linked with the broader, more heavily trafficked World Wide Web implementation of our narrative space. As we amass more and more of these granular story elements, we can begin to ask about signification at the collective edges of the experience.

The fun of building these pieces is matched to our learning. For now, we are on a shake-down cruise of new technologies, new paradigms of engagement, new scenario types, and fresh content. We sense that the greatest opportunities for interaction reside in the transitions between granular story elements; and, we are beginning to explore how Plot grows out of such nebulous, short-term structures.

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VRML: Writing The Space of Identity on the WWW

Introduction

As artists, designers, theorists, and scientists we have before us an opportunity of mythical proportions. We have before us the opportunity to create worlds. Worlds to explore and learn through, worlds in which to discover and create new aspects of ourselves, worlds in which the greatest limit to the extent of our existence is our imagination. This opportunity is now made possible to us on such a scale through the introduction of the Virtual Reality Modeling Language (VRML): a computer language which will allow anyone, with a bit of effort, the potential to create a distributed multi-user virtual environment. Along with this opportunity comes a responsibility: the responsibility to use this

enormous potential to its full extent. In this paper I will propose a paradigm for understanding the vast potential available to us, so that we may accept that responsibility with integrity and insight, and create worlds which defy and transcend our very existence as we know it.

I am going to discuss understanding and creating distributed multi-user virtual environments, specifically VRML environments within a linguistic paradigm. This paradigm is based upon the communicative, gestural, and social aspects of language, particularly a pragmatic view of language and its role in the gestural construction of self and society (Mead). My point of view is that in the case of a VRML environment language is experientially and existentially active. Unlike other gestural modes of communication the aspect of virtuality produces grammatically anarchic and nearly immersive experience, and as such provides the opportunity to create a profound grammar, which manifests itself in unique spaces of experience, identity, being, and self.

At a fundamental level in linguistic communication, and I will propose in VRML, we are dealing with the transference and signification of signs. It is through the process of signal to sign with signification that we have both the act of communication and the process of the creation of meaning in language (Eco). Within this semiotic framework the sign that is transferred need not be verbal or textual, it can take an infinite variety of forms. Within the concept of a sign we can even begin to include such modes of expression as those involving the body and the construction of and interaction in space. Specifically of interest here is the movement of the body throughout both space and time as the signification of something particular.

With the conscious inclusion of the construction of space and the interaction of the body within that space as a form of linguistic communication we begin to develop a sensory rich form of language that returns us back to ourselves, rather than utilizing a more arbitrary system of codes such as alphabets and phonemes for the creation meaning.

The VRML Environment As Linguistic

With the acceptance of the movement of the body throughout space and time as the signification of something particular, that is as a communicative/linguistic action, we can begin to speak about the communicative act as a gesture. To gesture is to make an action of meaning, and defining communication as gestural changes its nature (Mead). The defining of the communicative act as gestural implies 2 things: the first being that communication becomes again a conscious and conspicuous act, and secondly that the communicative act is social in its nature. The basis of the concept of gestural communication is the actuality of the communicative act: a definable, conscious and conspicuous action, which can entail speech and writing, but which also necessarily produces/observes the physical and social phenomena in another, more experientially direct manner.

The language of the VRML environment has 2 primary levels of complexity and gesture. The first is the virtual structure of the environment, its polygons and their ordering, and the second is the interaction of the user within that environment, creating a narrative discourse through interaction. The grouping together of the polygons into their organization begins the structure of the language of the environment. These shapes and forms can imply meaning in and of themselves as distinct entities. Their visual and auditory presence become signals which become signs and represent meaning through the process of signification. Often these virtual objects may present some representation of some thoroughly known object such as a chair or a room and as such carry a didactic meaning with them. At times they may be completely abstract forms and expressions transmitting a meaning of a more essentially visceral nature. Whether representational or abstract in form these objects within the virtual environment begin the transference and creation of meaning by their individual existence and potential for engagement with the participant.

By the communicative act in the VRML environment being gestural, we require both the author and the participant, in the construction of meaning: they both must assume responsibility for the communicative act therein, and in doing so, the communicative act becomes social. By this placement of ultimate responsibility upon the author and the participant we have a communicative experience of profound nature, in that the displacement of an arbitrary grammar requires a grammar of thorough and thoughtful implicitness.

Momentarily I will call up a profound figure in the history of linguistic thought, that of Benjamin Lee Worf. The Worf-Sapir hypothesis was one which posited a radical idea: that language was not only a communicative act, but the defining factor in our reality, in that language, or rather the expression of language, or if I may, the gesture of language, is a concrete manifestation of our thoughts. This theory proposes language as a unique structure, a structure which provides the architecture for its content, its content being thought, and thought: our subjective realities.

The Worf-Sapir hypothesis in the light of the concept of gesture suggests that our gestural act of communication creates our reality; akin to the adage "as above, so below." "As above" in that what has been conceived of as the higher plane of thought is "as below" that which we manifest thought to be through our language. Our gesture as language forms a structure both of and for the very expression

of thought, and as such an expression of thought, a mediation of reality and how we experience it.

Meaning and Knowledge Within The VRML Environment

Meaning within the virtual environment begins to compound itself, it begins to create a narrative discourse by the ordering of the distinct forms and objects to one another. As these individual objects are brought together within the environment their identities become relational to one another and expand meaning by the creation of a discernible context (Sarles). The room with the chair and lounge becomes a psychiatrist's office, or the abstract representational forms become the virtual manifestation of the patients Rorschach tests. These objects create a dialogue of signification both amongst and dependent upon each other. This dialogue, this structural narrative discourse, is then read by the participant through interaction within the environment.

The experiential grammar which is chosen and developed throughout the organization of shapes and interaction within the virtual environment is by no means arbitrary, in fact they are necessarily not so. This grammar of experience is explicitly defined by the author of the environment, and while the textual words used by any author or the verbal words by any speaker are also by choice, the chosen grammar within the virtual environment is explicitly rather than arbitrarily defined by the nature of the complexity involved in the gestural situation. Meaning within the virtual environment is actively constructed by an experiential grammar. This then is enacted by the conscious and conspicuous will of both the author and the participant within the environment.

The Vastness Of The Virtual

The fluidity of a VRML environment is manifested by the complex emerging grammar of VRML as a grammar of experience... of *happening*. Space and time exist in the virtual environment, but space and time need not be relative. Motion exists in the virtual environment but that motion need obey no laws of gravity. Within VRML grammar is a structure we create.

This difference of virtuality allows for an experiential motivation and capacity behind the knowledge product of the environment. The difference of virtuality provides the opportunity for the evaluation of information in the immersive, sensory realm. Pierce has posited that confronted with experience we try to create knowledge to explain it. Fundamentally, this is the goal of the full experience within a VRML environment. We, as participants, are confronted with the experience of the desktop immersion and interaction within a virtual space through which we must find knowledge. This experience is the cause to the effect of knowledge, of knowing, and ultimately of being. Within the VRML environment we must come to not only know of that experience, but we must more so come to know that experience. To know that experience is foremost to actively and intimately partake in it, to be able to claim first-handed-ness. Beyond even that though, it is to be able to define it, to give it meaning beyond even its representational form, to imbibe it with thought and reflection, and ultimately to create identity, self, and society within it.

The introduction of these new manners of language, these new methods of authoring and reading which we find in VRML environments, increases the level of interaction and experience beyond what was previously possible in the communicative act and places it within a realm of infinitely more risk, and potential for substance. Through VRML one can now, and does, consciously employ means in communication which were before primarily enacted only unconsciously. Motion, sound, space, and time. These all had the potential for inclusion in linguistic convention within non-virtual communication, but not necessarily conscious inclusion. Even in those rare moments of opportunity for the conscious inclusion of these matters their inclusion was dictated by a set of parameters which were based on a physical reality rather than on pure imagination. Now, in this realm of a VRML environment these parameters have ceased to necessarily exist.

Beyond Our Being

This ceasing of the parameters of corporeal existence within a virtual environment is where the opportunity for a radical writing of identity and being emerges. VRML provides an opportunity for the creation of an existence of being which can both represent and transcend by difference our corporeal existence, and in doing so, alter our very way of knowing, our very way of being.

The Infinite Possibilities (Including the Impossible)

If we invoke to the Worf-Sapir hypothesis on language and the construction of reality through the possibility to concretize thought we then have our key to unlock the infinite potentialities of being within the virtual environment. The language of a virtual environment allows us to concretize thought, and thus to create a reality, which is impossible outside of the confines of a virtual environment. It allows us to create a reality and existence of being which is not bound to preconceived notions of time or space, which is not limited to the realities of bio-acoustics or the realities of physiological existence, which is not bound by an arbitrary system of signs as is verbal/textual discourse. It

allows us to create an existence of being, a manifestation of reality and identity, which is limited only by the limitations of ourselves, of our imagination.

This experience which translates into knowledge, and ultimately into identity and self, lends itself to methods of creating not only a new grammar, but a new way of being, a new knowledge of being. This new knowledge of being by its existence as such radical other-ness, ushers in with it before unknowable knowledge. In this virtual environment of experience where knowledge and ultimately identity and self is manifested through the process of virtually being that which was before the "un-be-able," the "un-knowable" has the potential to become known. By unknowable I mean that which can neither explicitly nor implicitly be transferred as knowledge through verbal/textual language.

The Ultimate Potential

We have caught glimpses of this alternate reality before, they have existed throughout time in discrete and highly codified moments. George Bataille said that it is "action which introduces the known (the manufactured), then understanding, which is linked to it, relates the non-manufactured, unknown elements, one after another, to the known" (Bataille, p.11). This forms a feedback loop of meaning confined to knowing only the knowable. But he concedes there are moments when this is not exactly so. They have existed in all things transgressive: laughter and comedy in the face of misery, poetry and its assault on the convention of verbal/textual/rational discourse, and above all in the ritual moment in which the transubstantiation of materials and time and space occur to create an event of being which transcends all others.

Within the virtual environment we are able to undo this circle of knowing the knowable and not knowing the unknowable that Bataille has elaborated. We are able to do this through the realm of manufacture, that is the necessity of referring to that which is already known. In the virtual environment that which is manufactured, or at least that which may be manufactured, is not necessarily that which can be actually manufactured outside of this environment. This possibility allows for, and with integrity demands, a new creation. This allows for the manufacture of the non-manufactured, that is the un-known: the opportunity for the creation of an experience which executes the act of the impossible. This is an experience like those distinct moments of transgression, a moment in which all that was before non-knowledge by its being outside of the realm of our physical and/or linguistic reality can be known through the particularities of a virtual environment. The virtual environment becomes a space for unlimited experiential moments of being and the creation of an identity and self beyond even that which has ever been imagined: it becomes the opportunity for knowing and being the unknowable.

I want to conclude by proposing another metaphor for these ultimate possibilities for extended moments of difference within VRML environments. Paradoxically, it is a metaphor drawn from text; biblical text. The metaphor is that of Eden, a mythical place of being. In the story of Eden God dispels Adam and Eve from the garden for their consumption of the apple which gives them a knowledge of themselves that was before unknown. Virtual environments have the potential to become Eden: a place of infinite and glorious being. However, the metaphor has a fundamental difference, the tree of knowledge is not what will expel us from the garden, the tree of knowledge is that which we need to pick to keep the garden. As artists, designers, theorists, and scientists it is our responsibility to create this space, these virtual environments in all of their potential glories. It is our responsibility not only to eat the apple, but to intoxicate ourselves with it. In this Eden there will be no damnation for the pursuit of the unknown, but a consequence of banality for not doing so.

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More Real is Real — The Transorganic and Hypermorphic in the Einstein's Brain Project

In relating Pliny's famous anecdote about the artist Zeuxis, that Zeuxis (painted) a picture of grapes

so deftly represented that birds began to fly down to eat the painted vine, Richard Sennet comments that,

"a modern reader might take this to be a story about the artist's powers of illusion. A Roman thought it showed art's relationship to reality."¹

If there is a single general expectation of the recent advances in the technologies of virtual reality and hyper-interactive simulation it is that of its capacity to present an ever increasing realism. The quest for seamlessly reproduced worlds is paramount in the military and institutional development of the simulation technologies. The ideal (achievable or otherwise) of immersive virtual reality consists of surrounding an individual with images and sounds so apparently like those of the real world that the eye and consequently the brain is fooled into thinking it is in that world. These developing strategies are those of realism rid of expression, symbol or metaphor and they are sustained by the authorities of homogeneity and seamlessness. Just as long rendering times and their outcome of low frame rates are constantly, and expensively, fought against because they disturb the seamlessness and the effectiveness of the illusion so ruptures in the content and the consumption of the worlds are discouraged. Stopping to consider the strangeness of a sound distorted by being played too slowly or the flickering or jerkiness of an image disrupts our sense of ourselves as being in normal relations with a world. Similarly the consideration of a subtext or a hidden meaning draws attention to our consideration and away from the construction and sustenance of our normal relationship to the world.

One must see these contemporary desires as linked to a history of naturalism, its concurrent dualistic pairing of reality and appearance and the authority and correctness of institutional space.

"The (Roman) people also gained from believing that their ruler's building works bore the stamp of absolute authority. To the Romans we owe the phrase 'teatrum mundi', 'later rendered by Shakespeare as 'all the world's a stage.' A Roman could give him- or herself over to that willing suspension of disbelief which is the essence of theatre, assured that power guaranteed as consequent and correct those places in which the spectacle of life unfolded. The realm of certified stone literally set the stage for Romans believing the evidence of their eyes."²

If the architecture of the emperors assured the propriety of those places in which the spectacle of life was revealed and in doing so presented a true picture of the world, then the contemporary architecture of simulated reality likewise sanction and fabricate a seemingly world where the normal and natural are unattached to the understanding that such things are cultural constructions.

Einstein's Brain is a collaborative, immersive, virtual reality work that explores the notion of the brain as a real and metaphoric interface between bodies and worlds in flux and that examines the idea of the world as a construct sustained through the neurological processes contained within the brain. It suggests that the world is not some reality outside ourselves, but, is the result of an interior process that makes and sustains our body image and its relationship to a world, and that the investigation of virtual reality, its potential use as a perceptual filter, and its accompanying social space is an exploration of the new constructions of consciousness and the consequent technological colonization of the body.

The image of *Einstein's Brain*, a reference to the human brain and to Roland Barthes' essay of the same name serves not only as a metaphor, but, also a point of entry for a participant's journey through the virtual landscapes. The figure of Einstein embodies a variety of references from the comic figure of the mad professor, to the socially conscious scientist and humanist. His name is synonymous with genius. His body seems feeble beside the awesome, mechanical power of his brain. His name invokes man's quest for the secret of the universe. His brain has passed into the world of myth, cut up and minutely examined but revealing little. The title of our project assumes a link between science and mythology, between the machine and its capacity to offer a key to the unknown and the continual re-presentation of familiar structures and myths.

The project has at its core a series of worlds digitally generated from topographical maps, dxf models of the human body and brain, and neuro-physiological delineations which are rendered and organized so as to provide familiar yet unnamable, naturalistic environments. Embedded in these spaces are semi-otic references to literary, mythological, poetic and social content indicating that an appreciation of this artificial world through effect and appearance is congruent with a representation of the natural world inscribed over and over by mediating and mutating cultural bodies.

The worlds are constructed so as to be in constant flux. Like states rather than objects, they are affected by feeder streams of data, by passage through the worlds and by an elusive and changing perceptual apparatus. Indexes of labour, thoughtlessness and thoughtfulness, sensory deprivation and impairment, cleverness and stupidity effect dynamic changes throughout the system altering the body and topography of the worlds.

Active elements, external data sources change the worlds. We are working with a number of statistical agencies to develop a means to mark the changes in the global bio-mass which will in turn affect the worlds. We are linking these continuously changing worlds to various databases, astronomical, social, financial, topographical, medical and these effect the form and content of the spaces. The moon's grav-

itational forces change the form of the land, the stock exchange is tied to the growth patterns of trees and plants, the daily attendance at Graceland determines the current cultural pattern of the land. Local time elements age the worlds, matching the passage of real time – at night it is night and the only means of navigation is with the aid of artificial light. In Spring the worlds are Spring-like, pliant and fecund, in Winter the worlds exhibit brittleness and slow growth. Passage through the world is recorded – a twig breaks when a passerby comes too close, footprints are left in the sand, rocks are worn away by the many steps of many travellers.

Imagine a room, inexhaustibly full of images, sounds, smells and objects. One cannot begin to count all the objects in this room. There are so many, one would not know where to begin or to end. Imagine walking into this room clothed in a thick, insulating suit. Gloves cover the hands, ear plugs make hearing difficult, dark goggles cast the room into a permanent dusk. It is here at the twilight of the senses that the room begins to disappear and the sounds and pressures of the body emerge. Images and sounds seem artificial, lacking full resolution or credibility. Objects seem less solid, sometimes offering little no resistance to a passing body. Depth perception is limited and unconvincing. Remove the suit and the other constraints and the room is restored to full resolution and believability.

We are most aware of the brain when one of its functions is impaired. In absence the function exposes itself and draws attention to the remaining perceptual and communicative operators. A soundless or visionless world is noticeably so. Does the loss, or alteration of a sense make the world any less real? Is the world less real for a blind person, a deaf person, a person with double vision? Was it any less real for a Helen Keller? The breakdown of the normal connections in the brain changes the way we construct the world, but, it doesn't, however hallucinatory it may seem, alter our belief that we are in a world.

We think of the body as separate from the world. Our skin is the limit of ourselves, the ego boundary. The point at which here is not there yet, the body is pierced with myriad openings. Each opening admits the world – stardust gathers in our lungs, gases exchange, viruses move through our blood vessels. We are continually linked to the world and other bodies by these strings of matter. We project our bodies into the world – we speak, we breathe, we write, we leave a trail of cells and absorb the trails of others. The body enfolds the world and the world enfolds the body. The notion of the skin as the boundary to the body falls apart. The body, as here not there, and its defining sense of the other is a mental construction. Every perception of the other is a creation and every memory a re-creation.

Inside a virtual space we are almost blind, have little or no sense of touch, our hearing and sense of smell are enfeebled and inconsequential. Our sense of others is abbreviated or entirely absent. We are thrown back upon and into ourselves to sustain our sense of ourselves as being in and of the world. In the most deficient worlds do we lose the sense of ourselves? The sense that here is not there? That the body begins and ends here? Through its deficient rendering of the world virtual reality allows us to perceive our perceptual apparatus and the representations that construct the world. It suggests that the world is a virtual construction. That the development of consciousness, selfhood, is a function of its capacity to represent the world's contents symbolically in the face of a constantly shifting and exponentially multiplying material world.

We are embracing the simulation technologies as imperfect, reality engines connected not to the generation of a reality but as a means of attending to a consciousness that in turn fashions a reality. The real-time rendering engines provide a space in which the spontaneous processes of being in the world are made evident, generating what neuroscientist Antonio Damasio describes as a "dispositional representation of the self that is in the process of changing as the organism responds to an object."³ This dynamic representational process occurs in the brain.

The worlds we are generating from the physical and visual structure of the brain are a visible representation of invisible, mythic processes. These worlds are not external to the body, but, are properly thought of as being inside the body. This accounts for the apparent invisibility of the body in a virtual space. The body disappears because it is turned in on itself. The ego-boundary is no longer the point at which the body begins and ends in relation to an external environment, but is the very limit of the world.

"The brain imposes coherence on the external world not the other way around. The external world contributes the reflected light, the raw data, but the brain throws most of that raw data away and does the hard job of computing, piece by piece, the answer to what (is seen)"⁴ and, consequently, what is the world."

We are attending to the simulation technologies as diagnostic and analytical tools. The very deficiencies that prove so disruptive to the appreciation of a real-feeling world can provide a means by which content, and form, is made manifest. Virtual reality can act as a filter which renders visible the brain and its processes of the continuous construction of the self. It makes it possible to view ourselves as dynamic entities continually engaged in perpetual iconoclastic biological and social renovation and construction. Given this and other technologies of the self we are now able to undertake transmutational operations that enable us to recognize and transform our image of ourselves.

To this end we are developing worlds in which the raggedness of the virtual reality systems are exaggerated and invoke those dysfunctions of perception and selfhood associated with brain damage and

mental illness. Vision is blurred, detail is inconstant, slower or faster frame rates suggest a rendering engine behind the scenes, left or right hand sides of stereoscopic vision blink out, depth perception is lost, objects only appear when one is in motion, the edges of the worlds visibly reinvent themselves. In one situation the participant is only able to move through the world by turning to his or her right. Turning to the left freezes and fades the world to invisibility. In another, binocular rivalry, achieved by providing differing inputs to each eye via a stereoscopic HMD, causes parts of the world to be erased, or depending on one's immediately previous attention, to remain. Another uses a slower than normal frame rate to call attention to the motion of a falling object. In yet another, the redrawing of textures lags behind a changing parallax references the time light takes to hit the retina and invokes Barthes deliberations on photography in *Camera Lucida*. These are transorganic and hypermorphic world; worlds of smooth, contiguous fields inhabited by the nomadic body, a body, a self – in being, in motion. Antonio Damasio describes the continual, moment by moment, construction of this self as

*"an evanescent reference state, so continuously and consistently reconstructed that the owner never knows that it is being remade unless something goes wrong with the remaking. Present continuously becomes past, and by the time we take stock of it we are in another present, consumed with planning for the future, which we do on the stepping stones of the past. The present is never here."*⁵

As western artists, we developed from a world where we learned to objectify our bodies, to separate our minds from our bodies' viscera, where we learned to distinguish matter from mind and where the construction and placement of objects was the focus and culmination of our intentions and desires. Developments in cultural and social theory and in technology have suggested that we and other artists shift their attention away from a graspable, predominately corporeal world to one which is increasingly slippery, elusive and immaterial. Mind and matter, combining in the cognitive body, are interdependent. The world we inhabit is in flux, comprised of increasingly complex connections and interactions. In this world there are no fixed objects, no unchanging contexts. There are only coexistent, nested multiplicities. Spectator and spectacle are entwined, occupying the same space. Perception enfolds us in matter and synthesizing us and the perceived object. In a world of objects, the subject is characterized and limited by boundaries and frames, perceived very much as invariant and separated from an unbroken field of transformations. Now it is possible to view ourselves as dynamic entities continually engaged in perpetual iconoclastic biological and social renovation and construction. Technologies of the self permit us to undertake transmutational operations on our own bodies and allows us to transform our image of ourselves existing in:

*"a state of continuous construction and reconstruction. It is a world where anything goes that can be negotiated. Each reality of self gives way to reflexive questioning, irony and ultimately the playful probing of yet another reality."*⁶

Given this can we ever really know our own minds? Living in each other brains as voices, images, words on screen, the brain is merely one image among many, constructing and reconstructing itself even as it makes the world.

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Exploring Musical Space by Means of Virtual Architecture

The idea of using virtual architecture as a medium for musical exploration arose from my interest in open musical forms. By openness I understand conceiving form not as a line with a clearly marked starting point and an inevitable end, but as a field of possibilities merely laid out in a composition without anticipating their realization. Striving for open forms means aiming at the creation of ambiguous music characterized by a network of interrelations combining all its elements – music that does not know any final form in time and that opposes repetition.

It has been tried to create open forms by arranging musical texts in a way that enables the performers to choose among different possible readings during the performance of a piece. Pieces of this type sound different every time they are performed and therefore show a certain degree of openness. But this openness is in contradiction to the uniqueness of presenting music in a concert. The audience cannot comprehend the open form since it is listening to one variation of an open composi-

tion which is closed by the performance itself. The aspects of openness could only be experienced by comparing several of these variations. There are, however, not many opportunities to do so, since this would require performing one and the same piece for several times during one concert or releasing different versions of it on CD.

The high demands on formal openness can therefore hardly be met in the concert context and as a consequence, many composers gave up any serious consideration of the problem. In a way this is also due to the fact that the concept of the open form calls into question the concert itself as a form of musical presentation, which still causes a lot of hesitation among composers. Thus, the utopia of the open form, which can look back on a long tradition in the history of 20th century composition, may for the time being be regarded as a failure. Another reason for this might be found in the contradiction between formal openness and one of the basic qualities of music: its linear extension in time. It is, however, this apparent contradiction that makes the problem of the open form so interesting for me because it calls into question the nature of music as we know it.

In my opinion, musical installations offer an important alternative to the presentation of music in concerts. Because of its nature, an installation seems to be by far more adequate form of presentation for a music where aesthetic concepts such as openness, vagueness and ambiguity play an essential role. By way of example, I should like to briefly introduce my musical installation *En face*¹.

En face

En face is a type of endless composition realized as a computer program creating, once it has been started, a series of new variations of music. *En face* has neither beginning nor end and never repeats itself. Still, the music can always be identified as one and the same composition.

Strictly speaking, these characteristics are the only possible formal answer to the situation given by presenting music in an installation, since the audience can enter or leave the installation any time, spend as much time in it as they wish and maybe return after a day or a week.

With *En face*, I was first of all interested in this type of freedom – the freedom of the audience to move about the room, to be able to experience the music from different angles, to explore actively instead of having to follow from a fixed viewpoint a musical performance produced on stage, as is the case in a concert. My experience with *en face* showed that part of the openness laid out in the composition could actually be experienced. If one stays in the installation long enough and the program happened to explore similar musical situations (the main formal elements used), one can imagine the possibilities laid out in the composition. Once again, this is done merely by way of comparison, but still one gains the very clear impression that in detail, things might also have come differently. Another factor is that the program makes decisions on the structural level of the composition (i.e., regarding the music's deep structure) and not on the music's surface, on the level of a structure set in time, on the text level, as is the case with musical texts which allow different reading varieties.

The comparison with the musical text points to another important characteristic I should like to point out when discussing *en face*; as I said, *en face* was not conceived as a musical text, but as a program representing a composition model – a kind of meta-composition. This model represents, for me, a new type of musical artifact.

A New Type of Musical Artifact

In this context, I consider a musical artifact the concrete result of a composition process, in order words, the method chosen to represent the music. Normally, this would be the musical text, the score, which is basically characterized as being a text that requires interpretation in order to be received. In electronic music, the musical artifact is the tape – classical electronic music does know musical texts as such. The new type of musical artifact appearing in *en face* (but also in pieces by Karlheinz Essl, such as e.g. in his *Lexikon-Sonate*) redefines the relation between composer and audience as well as the circumstances and possible ways of composing, presenting, distributing and receiving music. In leaving out the interpretation process (which still plays a central role in the general understanding of music), this new type of musical artifact opens a range of highly interesting possibilities of composing. We are probably only at the beginning of a new development in music when using a model as means of representation. This open description offers a far higher potential for the realization of formal openness than the musical text.

The compositional limit I reached with *en face* may become clear when examining the composition process for a second: to compose, here, means to model, to program. By interacting with the model, it is itself being refined again and again. Simultaneously, the music produced by the model can be listened to while working on it. We can imagine the model as a kind of machine, its construction as part of the composition. The definition of levers attached to the machine in order to later on influence its function is also part of the compositional process. After finishing the construction of such a machine, one can start experimenting on it, i.e. using the different levers to control the effects the modification of parameters has on the model. This means exploring the possibilities inherent to the model, which has not only a representative but also a simulative function.

The compositional process is characterized in turn by a description of new possibilities or their modification and by a direct examination of the effects these changes have on the musical structure. If you know the model well enough, it can be explored in an interactive way. As for *En face*, I am, however, the only person to know it well enough, since the program was not written to be used by anyone else. This is why in *En face*, a second level was placed above the composition model. It explores the composition automatically by going through its inherent possibilities via a complicated hierarchy of directed random operations. Thus, a program takes over the exploration, automating the very level of decision on which the openness of a composition could be experienced directly – just like during the compositional process.

Camera Musica

In *Camera Musica*, the musical installation I am working on at the moment, I am trying to make this level accessible to the audience, to let them directly experience and apprehend the openness of the music. And this is exactly what I mean when I am talking about the exploration of music. The music in *Camera Musica* is basically conceived in a similar way as in *en face*, even if it sounds entirely different. As I have already mentioned, in *en face* I use a basic formal element I refer to as situation. This situation will be used in an extended form also in *Camera Musica*.

Situation

The music in *Camera Musica* is conceived as a family of various, interrelated musical situations composing in their interplay what we may call a musical space. And it is this space I wish to make accessible in my installation. So the audience should be able to move from one situation to another within this space and to slowly explore its special features through the relations between the individual situations.

Each situation is characterized by certain possibilities of choosing the musical material and arranging it, thereby determining the particularity of the situation, its mood, atmosphere, form and air. In a concrete situation these possibilities describe what can “happen” in the music, i.e., which sounds can be related in what way. Each situation has a static and a dynamic aspect. The static aspect results from the fact that any situation disposes only of certain possibilities. So after listening for a while one is able to predict what can happen and what cannot. The dynamic aspect is responsible for sounding out the local field of possibilities. Again and again, new combinations and variations are played through, thereby conjuring up the situation itself. From a global perspective, the music is making no headway, but within the local possibilities laid out in the situation it remains unpredictable, open.

What does the concept of the musical situation achieve on its way to approach the utopia of the open form? The situation as a basic element of musical representation holds in itself features of openness, undetermination. And since the composition does not lay down the sequence of situations but only establishes a wide variety of possible combinations on the structural level, it becomes an open composition. The situation concept can therefore be regarded as a solution to one of the key problems of interactive musical installations, that is the problem of articulating the music-inherent temporality by letting the audience participate. The movement the music itself performs, so to say, in order to appear can normally not be influenced by the audience. This is originally the basic situation of a concert which is mainly characterized by the pursuit of this movement. An interactive installation, however, should make it possible to influence the temporal form of music in order to make the moment of openness accessible. This other movement which is contributed to the music by the audience must be articulated with the movement inherent to the music. This is exactly what can be achieved by using the situation concept.

The movement taking us from one situation to the other is a movement on the level of the musical structure. It does not articulate individual musical elements but changes the more global qualities of music such as its harmonic color, rhythmic form, dynamic air or the relation of tone colors. These are the aspects of musical situations that are to be mediated to the audience and made comprehensible. This is the essential demand on a vehicle intended for the exploration of music which I believe to have discovered in virtual architecture.

Architecture

I got the idea of using virtual architecture when reflecting a detail of *en face*. An extrapolation of the *en face* concept made me consider a version of the installation designed for several rooms with something like a musical situation placed into each of them. The audience would be able to move within the musical space while walking from room to room. In such an installation the specific architectural features of a building (e.g., the order of the rooms and the way they are connected) could be interwoven with certain aspects of the musical structure to a far greater extent than in the original version of *en face* (which was installed in a single room). And this is just what is supposed to happen in *Camera Musica*, by means of virtual and not real architecture though.

But this approach was only the project's starting point. The possibilities of combining architecture and music, which I am trying to track down, are continually changing the project as a whole. On the one hand, this makes the project more and more interesting, but on the other hand, it makes its first realization recede further and further into the future. During my work on *Camera Musica* it became obvious quite soon that space can only be explored when it is carefully organized. What do I, therefore, expect from an architectonic structuring of space? First of all, I expect a certain readability of spatial relations. For the audience of *Camera Musica* the architectonic space will be a kind of text (not comparable, however, to notation), a kind of incomplete representation of the music or of possible ramifications of an open composition.

To achieve this readability, I use the language of architecture, elements of the architectonic vocabulary of structural design, well known to all of us from everyday experience, since it is architectonic symbols that help us find our way in urban spaces and decode the wide variety of meanings and programs inscribed in architectonic structures. In my reflections and experiments on the connection between architecture and music I seek inspiration in e.g. the functions of certain elements of architectonic structuring and the meanings attributed to them. I am thinking for example of a house's function as a protective shield against outside influences, as a definition of private territory, as a space for daydreams, or of the functions of openings in the wall such as a door functioning as threshold, as obstacle, as possible access, or of the fascinating concept of the window permitting us a privileged view of the world, that is a view from within our own four walls – a concept which seems to be closely connected to the development of the subject in the western world. Only if I see myself as a subject with my own perspective of the world, it will become important for me to not only conceive windows as sources of light but also in order to look at the world through them.

Aside from this very concrete approach I also consider it extremely exciting to think about possible ways of connecting the dialectics of inside and outside, of being protected and being exposed, of closeness and distance, of being open and being closed to the aspects of musical structure. In the musical discourse, spatial terms are used fairly often and also in our imagination we are constantly making use of various spaces. They serve as a means of ordering things. We arrange things in space so that they are not all in the same spot, to make relations between them become clear or allow them to develop in the first place. The concept of space is of essential importance to our thinking and feeling (we say e.g. that we need more space, we are constantly operating with spaces, and, of course, within spaces). When I am talking of musical space, I am not always referring to one and the same thing, but I do have a clear picture of what I mean in each concrete case. It always has got something to do with the relation between different elements, with the distances between them, with the possibilities of getting from one element to the other or with the forces working between them.

Virtual Architecture

As mentioned above, when talking about architecture in the context of my work I refer to a kind of virtual architecture which is not understood as a model for a real architectonic project. To a certain extent, my way of using architecture is very close to architectonic sculpture, a form of sculpture incorporating architectonic elements in its formal repertory without becoming architecture itself, that is without serving a function in the conventional sense. Virtual architecture has no other function in *Camera Musica* than to stimulate and structure the exploration. Still it is closely linked to the traditional functions of architecture since it refers to a use of forms which has its roots in real architecture (e.g. by using openings like windows or doors and meanings attributed to them).

In virtual architecture, function as well as material constraints and gravity do not apply, but may exert their influence via the use of forms. The virtuality of this architecture opens up interesting opportunities of playing with the relationships of tensions between slightly modified formal elements and their counterparts in real architecture (think of a wall built of floating bricks). Vision and movement (i.e., the change of perspective) are the only ways of approaching virtual architecture. When exploring it, smell, temperature, tactile stimuli and the sense of gravity and balance are no longer important. These conditions mark out the frame of what is possible and what can be reached in virtual architecture within *Camera Musica*. The only sensible approach will be by being aware of these conditions and making active use of them.

Sketch

Camera Musica is a work in progress. One of the sketches realized with GMD's *CyberStage* system shall now be discussed here to illustrate what has been developed above. In the sketch a simple visual scene is linked to a set of related musical situations. Using the classical walk-through metaphor, i.e., limiting user interaction to spatial navigation, the audience is immersed in a very concrete visual scene acting as interface to a more abstract musical scene. The relationships to be discovered between these two worlds let the music appear in the imagination and memory of the audience.

CyberStage

The *CyberStage* is GMD's CAVE-like audio-visual display system which integrates a 4-side stereo visual display with an 8-channel spatial auditory display and 6 vibration emitters built into the floor. The *CyberStage* is a highly immersive display ideally suited for creating virtual environments. Viewer centered stereoscopic imaging and spatial sound rendering provide for an advanced degree of presence in virtual space. The sketch described here was developed with GMD's Avocado VR toolkit and a sound server based on IRCAM's Max/FTS system.

Visual Scene

The visual scene used in the sketch consists of a building-like structure composed of free-floating walls of various dimensions and colors. A free-floating ceiling unites the walls and forms an interior space. Some of the walls reach out into open space thus mediating between inside and outside. The different heights of the walls create permeable sections with varying degrees of spatial continuity. Invisible spot lights are used to articulate the spatial structure and mark points of attraction. The light passing through the gaps between the walls and the ceiling enhances the impression of weightlessness and permeability. Global illumination techniques are used to create a strong sense of spatiality. The combination of daylight and artificial light (only visible on the videos) was inspired by Magritte's famous painting *L'empire des lumières*, which shows a night scene with artificial lighting under a day-light sky.

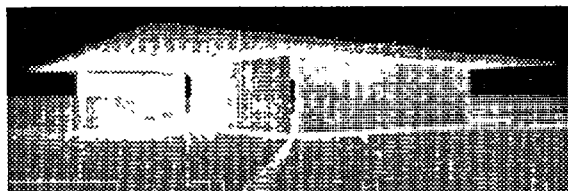


Figure 1

Musical Scene

The musical scene is composed of different situation which are mapped out in the visual scene. The following three examples show some basic possibilities of relating the visual with musical scene. The examples were recorded in real-time and directly from one of the video outputs of the *CyberStage*. The first clip illustrates a sound texture linked to a red beam floating above ground. Whereas the beam (which is actually a very low wall) only suggests a division of space (maximum visual continuity), the sound texture articulates the section to a much stronger degree. This shows that the visual and the musical space are thought as complementary components of the installation.

<http://viswiz.gmd.de/~eckel/publications/eckel97b/clip1.mov>

The second clip illustrates the transition from exterior to interior space. Visual outer and inner space are clearly linked to different musical situations. In this example the relationships between the musical and architectural structure are very explicit and direct.

<http://viswiz.gmd.de/~eckel/publications/eckel97b/clip2.mov>

The third clip is more complex as it combines several types of spatio-musical articulations. The relationships between the situations defining the musical space become apparent.

<http://viswiz.gmd.de/~eckel/publications/eckel97b/clip3.mov>

Video

In order to illustrate the user interaction with the installation, a 5 min. video was shot with a fixed camera located behind the *CyberStage*. The video shows the images projected on the three walls and the floor as well as the user's silhouette as he or she is navigating through virtual space. Since the image projection in the *CyberStage* is calculated for the current position and orientation of the user's head, the images appear distorted to camera positioned behind the display. The user always sees undistorted images. The 8-channel spatial sound output of the sound server has been mixed down to a stereo signal preserving some of the spatial information.

<http://viswiz.gmd.de/~eckel/publications/eckel97b/eckel97b/sketch.mov>

Notes

1. *En face* was realised for Mediale 1993, Hamburg, commissioned by Interface II and supported by the Zentrum fuer Kunst und Medientechnologie Karlsruhe. The installation was presented in the Orgelsaal of the Hamburg University for Music and Dramatic Art as part of the art program for the symposium Interface II. It was open to the public for three days.

2. Since the example movies at the end of the text could not be included in this version of the document only the URLs could be given instead. The URL of the complete online version of this document is:

<http://viswiz.gmd.de/~eckel/publications/eckel97b/eckel97b.html>

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The Diverse Meanings of Artificial Life

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A recurring image comes to mind when confronted with aspects of the future. It is the image of a single physical human pose. The figure faces forward, arms outstretched. The position of the arms varies considerably. In one version the arms are open and palms beckon inward while in the other, the arms are taut, pushing with palms braced against an inexorable movement forward.

This physical sensation of being dragged forward only coincides with the second pose, the one I interpret it as a fear of the future. Curiously enough, the welcoming variation of the same pose doesn't include the dragging sensation, but instead finds the figure planted in the present. It welcomes the future to where it stands instead of being dragged unwillingly towards a future it does not understand and fears.

I've found envisioning as well as physically recreating this pose in its variations has helped me understand the complex meanings in our reactions to the future, specifically to concepts existing in the present in embryonic form, but indicating possibilities of fuller existences to come. One of the most interesting of these, and germane to much recent work by artists involved with interactive technologies, is the growing research program, artificial life.

According to Stephen Levy¹, in his book *Artificial Life*, philosopher Elliott Sober doubts that a purely philosophical answer to the question "Is it life?" is possible, nor is the question itself ultimately important. Sober comments:

If a machine can extract energy from its environment, grow, repair damage to its body, and reproduce... what remains of the issue whether it is "really" alive?

The question of whether or not artificial life is "really" alive may not be ultimately important, but the question tends to threaten people. Most of us are "speciesists", a term coined by Richard D. Ryder to mean those who practice prejudice towards animals essentially comparable to racism and sexism, and used by philosopher Tom Regan² to mean "attempt(s) to draw moral boundaries solely on biological considerations." Similarly, physicist Gerald Feinberg and biologist Robert Shapiro have coined the term "carbaquists" for the majority of the human race that feel life only exists if it is composed of the same matter as natural biological organisms.³

No one has successfully proven that life either could or could not exist in any other form. Neither have angels been proven to exist, or elves or goblins or ghosts or animal spirits, but throughout the world's cultures these entities, real or not, have meant something profound to people. They have been the carriers of diverse conceptual meanings: good, evil, spirituality, mysticism, the afterlife. In addition, however, they have been carriers of more mundane meanings, and I use the word "mundane" here in the sense of rooted in the everyday living culture of a people, such as the particular religious, ethnic, tribal, geographic or time based culture from which they have grown. One thinks of Christian angels, Irish elves, Medieval goblins, African ghosts, or Native American animal spirits.

If I seem to be making a connection between these various visible-only-to-the-initiated beings, what most scientifically oriented thinkers would dismiss, at best, as imaginative ideation by primitive cultures, and artificial life "creatures" or forms, you can be sure I am and it is a connection of meaning. It seems to me that the fascination we feel when engaged with artificial life forms comes from the same source as the fascination we have always felt for quasi life forms. They are arbiters between this actual reality and other realities we think might exist, whether that might be heaven, hell, the underworld, the place of our ancestors, or in the more contemporary version, the silicon future. What is interesting here is that rather than looking back as people before us looked to the past through these quasi-life forms for answers or guidance about the meaning of life, we are looking for answers about the future.

In order for us to understand what metaphorical meanings alive might generate for cultures with which it comes in contact, a look at the meanings and goals of the overall research agenda of life is necessary. Emmeche⁴ outlines four central tenants for what might be considered a "strong" alive stance, one that includes a belief that life is not dependent on the medium. This stance comes primarily from Christopher Langton and his shepharding of the artificial life research cause through conferences and publications. It differs from other research agendas in artificial life, such as Francisco Varela's, who sees Langton as something of a traditionalist. Varela's program emphasizes the interconnectedness of the process, the medium and the environment, instead of the function of a process emphasized in Langton's program. But Langton's overall agenda is by far the most accepted in the scientific community, and so let us look at what he emphasizes.

These four tenants are:

- 1) The goal of a life research is to render an environment for the study of life as it-could-be. This will allow a theoretical biology to emerge based on generalizable organizational laws, not merely based on earth's evolutionary sequence;
- 2) The use of the synthetic method, based not on analyzing living beings, but synthesizing life-assembling processes or behavior in computers or other media,
- 3) The insistence on real (artificial) life "emerging" from the process of interaction of individual components;
- 4) The general understanding that all life is form, a process governed by a logic independent of the medium (It is here that Varela disagrees).

For the purposes of this essay, I would like to concentrate on the first and fourth tenants, that of "life-as-it-could-be," and that of the assumption that life can be understood separately from the medium. To begin with, why study life as it could be? What meanings do the scientists themselves attach to this research agenda? Chris Langton⁵ explains:

"We sense that the evolutionary trajectory that did in fact occur on earth is just one out of a vast ensemble of possible evolutionary trajectories – each leading to a biology that could have happened in principle, but didn't in fact solely for reasons of accident combined with common genetic descent. We sense that the regularities we seek would be revealed to us if we could just get a glimpse of that space of possible biologies"

On the surface, this paragraph indicates a desire for a more complete picture of the general laws of life and biology than now exists. We may intuit the desire for a more positive future, one that we might change through understanding it better. We may intuit another possibility besides our human-centric perspective, a perspective that has caused myopic and destructive behavior on our parts towards the world at large. I hear, however, in this paragraph, a tremendous longing for what "could" be, not for study, but for a different reality. Underneath this first general principle of the artificial life research agenda is the wish for perfection, for something other than what we have, other than what we are. Langton is the first to admit, even in this introduction, that the research agenda of artificial life raises tremendous ethical questions. His belief in the possibilities of his work to create alife combined with self knowledge allows him this perspective and I see that as a step in the right direction, but artists are contributing to this process of critical involvement as well.

Artists Christa Sommerer and Laurent Mignonneau⁶ are examples of artists who interpret the principles of artificial life in their own unique ways. They insert the human observer into both the previously closed structure of the art making experience as well as into the artificial life interaction itself. By doing so, they undermine the fourth tenant of the artificial life research agenda, that life can be defined as independent of its medium. They

"...assume, similar to Gregory Bateson that the patterns of mind (consciousness) and the patterns of matter are reflections of one another and part of an unbroken dynamic whole."

But the human artistic agenda here, while welcoming the future does more than just accept the notions of artificial life for its own aesthetic ends. Without denying the possibility of artificial life, it insists on the inclusion of the existing biological medium in describing that possibility. In that way, it contributes to both a new understanding of the creative process and to a new paradigm of thinking about artificial life. In talking about these metaphors of meaning it is important to understand the context in which they are developing and the mythologies they emphasize. Roger Malina⁷ makes this point best when he says:

"I think that the new biological sciences and technologies force us to break the distinction between the "we" and "the other," and to view carbon- and silicon-based life forms as an inter-linked system, within which artistic work can be carried out. Just as space exploration forces us to look at life on earth from the outside, so the new biological sciences force us to look at life from the inside – as part of a continuum of self-organizing processes in the universe."

This view is very different from that of the traditional Western dichotomy between human and nature, between body and mind, as well as Langton's version of the alife agenda.

Jane Prophet's⁸ Technosphere has evolved as a process- and concept-based artwork in which "creatures" generated by users through the WWW affect the artificial life environment of Technosphere. Prophet's comments about museum and gallery based exhibitions of the project indicate that the users' continuing connection with their creature is an essential component of the success of the project. Though users' in museums or galleries are not emailed continuing information about their "creatures," they are snail-mailed information. Receiving a postcard via human mail carrier on the condition of an artificial life form that you have created seems to me to be a wonderfully rich metaphor for the meaning of our relationship with artificial life research and its applications, artistic and otherwise.

Our physical environments, whether they be museums, galleries, our still unconnected schools, or our many computerless homes limit us in our abilities to interact with our digital creations. We still receive mail by postal worker, and he or she still hoofs it from house to house. We are in many ways ill equipped for the creativity we are capable of. Those limits are set by our own biological roots in the environments which support us to go on creating.

Though universal access is the new demand, Joe Lewis⁹ asks an essential question of the supposition that access to technology will automatically solve all the ethical questions engendered by its use:

"...will equal access encourage the opposite, a drone underclass, economically, physically, and spiritually, dependent upon "virtualness" for its life force?"

One only has to think of the role artificial life based games for both young girls and boys are beginning to play in the formation of a young adult personality to understand the practicality and foresight of Lewis's question.

Jill Scott's¹⁰ new work at the ZKM, Medienmuseum Karlsruhe, *Digital Body Automata* asks similar questions. She says:

"These works suggest that a shift in our notions of 'matter' and of 'nature' may change the way artists represent the human body. As micro-biologists have cloned a sheep and predict human cloning in the near future, I wonder, both from the perspective of a woman and an artist what will happen to 'reproduction.'"

Scott's work and comments allowed me to perform another visualization. This one involves mothering. If I allow myself to both conceptually and physically sense the experience of being a mother to these artificial life forms and the meanings they generate for the present and the future, I begin to find my first satisfying path through all the thinking and writing I have been doing about artificial life over the past year. Sara Ruddick's¹¹ book *Maternal Thinking* makes the case for viewing maternal practice as demanding a distinctive reflective discipline, while not regulating this discipline to gender or biological qualifications for inclusion. She says:

"Daily, mothers think out strategies of protection, nurturance, and training. Frequently conflicts between strategies or between fundamental demands provoke mothers to think about the meaning and relative weight of preservation, growth and acceptability."

This book, along with my own experience as a mother, has initiated a much longer conversation with the ideas posed in this paper. As artists, we have mothered, if by that we mean protecting, nurturing, our creations on the basis of a future goal, how we expect them to evolve, often only to find, to our surprise, that our creations have taken on a life of their own. They have turned out differently than what we had expected. Not for better or worse, just differently. My experiences as a maternal thinker have been faced with similar opportunities.

The second pose I described at the beginning of this essay, the one planted in the present welcoming the future to come to it, probably grows out of those maternal reflections. It may be that the discipline of maternal thinking coupled with the physical and conceptual poses I describe offer a helpful model for becoming involved with the development of artificial life. This model strives to nurture and protect the children of the present, both human and otherwise, while welcoming the needs of future children, both human and otherwise. This model weighs demands of both, while developing strategies of imparting these same values and meanings to their charges. Mothering the future is a role we all might wish to take on

1. Stephen Levy, *Artificial Life* (New York:Vintage Books, 1992) p.8
2. Tom Regan, *The Case for Animal Rights* (Berkeley, California:University of California Press, 1983) p. 155.
3. Levy, p.8-9.
4. Claus Emmeche, *The Garden in the Machine* (Princeton, New Jersey:Princeton University Press, 1994), p.17-20.
5. Christopher G. Langton, "Editor's Introduction" in C.G.Langton (ed.) *Artificial Life.An Overview*, 1995), p.ix- xi.
6. Christa Sommerer and Laurent Mignonneau, "Art as a Living System" in R. Ascott (ed.) *Consciousness Reframed: Art and Consciousness in the Post-Biological Era* (Abstracts of the Proceedings of the First International CAiA Research Conference, held July 1997 at the University of Wales College, Newport) p.86.
7. Roger Malina (1996) *Moist Realities:the Arts and the New Biologies* *Leonardo* 29(1), pp.351-353.
8. Jane Prophet, (1996) "Sublime Ecologies and Artistic Endeavors," *Leonardo* 29(1), pp.339-334.
9. Joe Lewis, "Isolation, Wired or Chained? Community Web Building in the Era of Global Testpadding" in R. Ascott (ed.) *Consciousness Reframed:Art and Consciousness in the Post-Biological Era* (Proceedings of the First International CAiA Research Conference, held July 1997 at the University of Wales College, Newport, in press).

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Notes on the Architecture of Living Documents

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The following essay, in large part, flows from the ideas of genre and documents presented by Dr. John Seely Brown and Dr. Scott Noam Cook. Another major influence has been the fundamental work on Ubiquitous Computing and "Calm" technology of Dr. Mark Weiser. Many other ideas stem from the extraordinary environment of Xerox PARC, where I have the privilege to work. However, most of the definitions of the major terms in this essay are my own, and are not necessarily widely held. I must take responsibility for the errors which result.

Documents, Genre and Document Systems

Documents are physical missiles from the past. A document was always created at some other time, a time not now. A document exists in our three dimensional physical space though it is the result of, and a capturing of, a temporal activity. Your child dancing at a party on video tape; the writing a reminder on a Post-it note; the tedious construction of HTML code for your home page.

A document must be performed to re-enter the vast river of sense – sound, shape, smell, touch, taste – that surrounds us, and embeds us, at all times. This performance can be by a human (say, reading a book); by a machine (a clacking movie projector); or lately by a computer (a raucous video game). Performances of the same document may vary. The performance of a document is by no means the same as the replaying of the captured activity. What the novelist did for two years while writing the book is not what the reader experiences. The replayed phone message is not your mother talking.

Many people assume that there is a dialectic or continuum between communication and documents. Some might even say a document is a piece of frozen communication that continues on its way when thawed by performance. Or that a document is just the name for part of a very mediated, very slow, communication stream. But in my taxonomy, while documents and communication are related by co-evolution in innumerable ways, they are different animals. There is communication without documents and documents without communication. When I speak to you on the phone that is communication without documentation; if you secretly record the conversation, the recording is a document but is not necessarily a communication to the lawyer who listens to it three months later. If during a conversation you draw an explanatory floor plan on a napkin, the napkin-document does become part of the communication. Finding someone else's napkin-document, while intriguing, is not usually communication. The performance of a document is not necessarily communication and despite the ubiquity of video cameras and microphones, all communication does not, at the moment anyway, produce a document.

A document is produced by the modulation of a medium that has stability over time. Though this stable media must stay reasonably unchanged over days or eons, we usually pick fairly easily alterable media to modulate: things such as small magnets on a spinning hard drive; ink on a piece of paper; or colored water on a canvas. Why waste energy? But those crazy humans have been known to modulate even the rock on the side of a mountain into a document of their leader's faces. Given the vast snowstorm of documents and media we live in, we might say that just about everything has been tried, and most anything works.

A document is always within a genre. Genre is a fully nestable concept. A novel is a genre of printed matter; a mystery is a genre of novel; a murder mystery is a genre of mystery; and so on. A single genre, say a newspaper, is usually composed of multiple genres. The sports section and the comics are both themselves genres. The title of a news story is a genre with its own aesthetic, separate from the news story genre itself. While many genres have written rule books (another genre), most genre are defined by what Wittgenstein would call a cloud of features. Though there are many differences, I can usually tell what are headlines even in a Japanese newspaper. It is perhaps amazing that one can say something like "I like rock music" or "I don't like country western music," and mean something by it. Genre defines social existence and tribal boundaries in uncounted ways.

Genre is critical in document construction. It organizes thought and activity: how you write and think about a poem is different than how you write and think about a novel or a screen play. A genre creates a tool system around it, which is economically feasible due to economies of scale. The instruments of a rock band are different than the instruments of an orchestra. Esoteric knowledge develops around the construction of documents. There are people who know the differences between AutoCad

13.0 and AutoCad 14.0, just as previous generations knew the difference between a #2 and a #4 pencil. Genre allows jazz musicians who have never met to play together. It allows you to sit down at just about any computer in America and pound out PowerPoint slides. Genre gives one a fair idea of how a document will be performed. When you master a CD, you expect that it will be played on a CD player. This is important, for genre also sets up desire. People want to write novels because people read novels, want to make rock music because people listen to rock music, want to draw house plans because people build houses.

Genre gives structure to a document so that when you read the funnies, you know that the whole newspaper is not the funnies. Genre allows us to concentrate and make sense of the parts of a document by understanding their tacit relationship to the whole. Genre also specifies systems of understanding which are held in common by document constructor and consumer. These can be as specific as the English language or the architectural symbol for a double-Dutch door. They can also be as general as what a "cut" means in a feature movie.

Genre sets up interesting patterns of commerce which allow everything from bookstores, to movie theaters, to printing plants, to the world wide web, to rock clubs, to accounting programs, to video tape machines, to video game stores, to architect's offices to exist and thrive.

While much attention is given to document consumption (this is supposedly the age of content after all), document construction is probably more important. It is during the construction process (often very long compared to the document consumption process with ratios reaching thousands to one) where ideas are formed, where thoughts are produced, where invention is created. One does not pre-form all of one's ideas and then sit down at PowerPoint or AutoCad and simply plop them from brain to paper. More often, multiple people, in repeated, long iterative sessions, create consensus as the document is produced. Document construction is often the moment of community formation and understanding. It is war and peace by other means.

In the end the document is "Other" in the Hegelian sense. When an author finishes a book, that book is said to acquire a life of its own. When an architect finishes a floor plan the blueprint forms its own relationship with Allah. One has a hard time to impossible time controlling a document once constructed. The performance of a document and the meaning of that performance is not owned by the document creator no matter what Disney says on their video tapes. Not only is the performance other to the document creator, the performance is other to the document itself. Even in such interesting document types as memorized poems (which most were at one time) the poem is other to the brain which memorized it and it is different from the memory of a reading or a hearing of the poem. This otherness of the documents that surround us create a shadow world in which we slide.

Documents exist within genre, which might be thought of as large extended families of documents, further most documents exist within heterogeneous "document systems." The relationships between the varying documents in these systems are surprisingly regular. In an architect's office, for instance, there will be systems of documents composed of the original written specification by the client, rough pencil sketches, an AutoCad file, a backup of the AutoCad file, a printout or two of the floor plans, a hand drawn elevation of the house, a spread sheet of the cost of materials, a photocopy of that same spreadsheet, a Post-it note with the telephone number of the client, an invoice, a cancelled check and perhaps a photo of the finished house. These documents as a whole constitute the document system. Each of these documents is related to the other documents in the system in known ways. In well rehearsed and schooled methods each of these documents was used during the document construction processes to create the other documents in the system.

Wet, Damp, and Dry Document Systems

In the modern office most spaces are designed for both document construction and document consumption. The denizens of the office, lately referred to by that peculiar word "knowledge worker," do not just shovel knowledge from here to there (though that might be management's ultimate desire), but construct new knowledge by constructing new documents which almost always requires the consuming of vast buckets of existing documents. Document consumption and construction, particularly in the corporate environment, are highly ritualized social acts. Different rituals require different kinds of spaces. On a continuum one can define three kinds of spaces designed for document construction and consumption. These spaces can be called "wet," "dry," and "damp" spaces.

An example of a wet space might be an auditorium, a conference room or even a crowded office where the participants are sitting together and can smell each other's breath, can feel the sweat on each other's brow, can physically bump into each other's suits and touch each other's suits. Performed documents in a wet space are things like PowerPoint slides, presentations, videos, agendas, handouts, overheads and the like. But several kinds of Document construction also take place in a wet spaces. In large wet spaces minutes are taken by a secretary, notes are scribbled into notebooks, sketches are produced on envelope backs, lists are produced on white boards and these lists are typed into laptops. In small wet spaces, say two or three people huddled around a computer screen, we find partially completed documents being edited, word-smithed, re-drawn and re-worked. These small, wet

meetings, usually held under threat of deadline, probably come closest in our culture to the Vulcan *mind-meld*.

A dry space is your office after you have closed your door, turned off your phone, closed your email icon and stopped the transmission of your shared video link. You are alone with your books, your documents and your unconnected computer. It is a moment when many workers say something like, "Now I can get some work done," meaning, of course, now they can consume, but mostly construct, documents. It is in these dry spaces, away from other humans, that the detailed fabric of complex documents gets put together. You draw the new floor plans, you create your next presentation, you type in your trip report, you run the heating and cooling numbers, you pour over tables to determine what materials you will use. There is also a kind of trust or ownership which is built between the worker and his or her document in such spaces: a bonding between the human and the otherness of mediated media.

A damp space is a space where there is only the mediated presence of other humans. These days this mediation comes in many forms: remote video, email, telephones, chat rooms, shared documents, conference calls and immersive 3-D displays containing stiff little agents. While there were a few damp spaces before the electronic era, they were few and scattered. The invention of the telegraph, telephone, radio, TV, computer and so on changed the world such that we seem to now live in a continuous damp space punctuated only by dreaded wet meetings and rare dry moments alone in the office. Where once dampness was used to mitigate the problems of distance, it is now often preferred, even when wetness is possible. "I don't have to smell his dirty socks," says a remote video collaborator who is separated from his partner by an easily removable wall, but connected by \$15,000 dollars of video equipment. Damp spaces turn out to be much like prophylactics: they allow a certain kind of human interaction that would be too dangerous to engage in otherwise. Because of these properties, damp spaces turn out to be hothouses of document construction if for no other reason than it is possible to turn most damp communications into documents by just hitting the "record" button.

Documents migrate between wet, damp, and dry spaces in complex, interesting, and often formalized, patterns. The PowerPoint presentation given in the wet space was constructed laboriously in a dry space. The notes that some one took during the meeting, based on the slides, were later typed into a computer and sent out as email on the dl, a damp space, where they were altered and corrected by the entire group in both wet office meetings and dampish phone calls. These damp notes eventually were pulled into another dry space, where they were worked into another presentation for next week's wet meeting.

There is nothing more disconcerting in the office environment than having document behaviors designed for one kind of space being in-acted in the wrong kind of space. Reading your e-mail at a meeting is just as irritating as the speaker phone in the middle of the table during a very wet argument. Such *faux pas* lay the groundwork for future taboos.

Living Documents

Within the ever growing damp spaces of the world a new kind of document is arising, from the ooze as it were. It is a document that while always finished, is also always in flux. It is a document that is simultaneously being constructed by a society of people, even while it is being consumed by that same, or related, society of people. To these people it is the weekly, daily, hourly changes in the document that matter, though it is the constancy that draws them to it. Because of this constant and continuous shifting the document seems to take on vital signs, it seems to have a life of its own, but its life is actually a reflection of the community it finds itself within. One can call this kind of document, a "Living Document."

A Living Document is not an interactive document, which is simply a document which can be performed differently depending on user input. Nor is it just a collection of smaller documents, much as a library is a collection of books. A Living Document has a wholeness about it which allows the parts to be read, and understood, meaningfully as one. While Living Documents are related to document systems, they are not simply document systems. A Living Document's parts, its sub-genres, are related in the way that my body parts are related, or the buildings of a city are related: they are related by identity. And while the dynamism of a Living Document pulls it close to communication, and a Living Document is often part of a communication system, Living Documents are primarily and fundamentally documents.

Living Documents are documents that are being continually constructed and continually performed, usually by a defined society of people. This society, its mores, its habits, its work practices, its routines, its social structures and importantly, its genres, keep the Living Document's construction architecturally sound while under constant renovation. Because the Living Document is in constant flux, it cannot be referred to by content, rather, it is referred to by site much as we refer to Paris by site. If I visit a Living Document next week, I do not necessarily see the same thing I saw last week. It is precisely for that reason I might revisit it each morning. I wish to know what my tribe is up to. What I know is where to look. I also know the mythic structure of this site: its history, the people, who have made the site, the stories

about the site. It is in this way that Living Documents are like cities. Paris is not the same today as it was five hundred years ago. But it is still Paris. And I have desires to go to Paris.

One rarely constructs a Living Document from scratch and even then it usually starts out with a selection of recruited documents like so many mobile homes converging on a trailer park. Construction in a Living Document is like building within an existing city. Like cities, Living Documents are structured chaos: some are radial, some are grid-like, some grew up organically along the banks of existing rivers of documents. As one builds in a Living Document one finds various zoning laws, enforced either implicitly or explicitly. You can lose your job if you add to a Living Document the wrong way. Like all normal humans, one usually checks to see what the humans near by are doing and does the same sort of thing. Every so often there is redevelopment. Every so often there is a fire. Existing architecture constrains new construction, but also makes it meaningful.

From one day to the next a Living Document will be pretty much the same, yet over time radical shifts can take place. Like both a city and an embryo, the morphogenesis of a Living Document is highly influenced by its current structure; but unlike an embryo, but like a city, it is actually formed by the community of humans who use it and live with it. The Living Document and the living culture it exists within are symbiotic. They co-evolve in that the Living Document alters the society that builds it.

Many Living Documents have "museums," often called archives, however it is rare when one can actually reconstruct past eras and by-gone days by shuffling through the dusty corridors. But the past is present in echo form, in the city and in a few historically preserved document fragments that often stand like marble state buildings at the center. How a Living Document grows from its past often comprises an entire neighborhood of verbiage within the Living Document itself. Preservationists scurry about hoping to capture pictures of the present for they know what all historians know: the past will be used in argument for the future.

A Living Document must be monitored, nurtured, tended, groomed, fed and paid attention to or it dies. To achieve these goals Living Documents tend to be surrounded by a hailstorm of smaller documents. These related documents: email notes, newsletters, advertisements, posters, etc. ask people to use the Living Document, to add to it, to look at it, to read it, to alter it, to become engaged with it, to think about, to make it the center of their work-a-day lives. Sometimes it is like having a hungry beast in the office — best to keep it fed.

The construction phase of typical document is usually highly iterative: add some, erase some, build some, edit some, write some, revise some, re-read, stand back, add a little more, declare it done. It moves from pencil sketch to finished engineering drawing by slow accretion and fine and rough sanding. It moves from preliminary to finished. But a Living Document is always done, is always finished, (though there are occasional moments of renovation when faux "Under Construction" signs go up). As one consumes the Living Document one is often also constructing it. Adding a comment, a pointer, building a small room, a little storefront. More often than not, however, large pieces are built off-world, out of the city in the suburbs, and shipped in almost completed. Just have to hook up the plumbing. Like houses in Milano the doors to these new villas are often small and nearly unnoticed, unstated blue gates in a wall. It is only by going through the door that one finds a cocktail party in full swing.

Conclusion

As we speak, almost all Living Documents are maintained, in full or in part, on computer systems. Whatever else computers do, computers seem to cause hallucinations in human beings about the nature of the world. They have created a strange belief that there is a "physical" world and a different, yet parallel, "virtual" world and that these two worlds communicate with each other via an "interface." That there is no virtual world, that everything is physical, is obscured by these powerful visions. Like early film goers we are still ducking at projected trains. This mysticism is highly disconcerting and politically dangerous for the vast computational infrastructure we are building, so that we can have 17 inches of flickering light on our desktops, does not lay lightly on the surface of the planet nor is it politically neutral. We can expect in the near future that the cutting of a network T-10 line to carry with it the death penalty. The amount of arms that will be required to maintain this system is yet to be calculated. But in the end, though I am not positive about this, it is this hallucinogenic property of computers which makes the kind of document we have been speaking about seem to actually breathe.

I would like to end this essay on the architecture of Living Documents by noting that we are standing at the threshold of an entirely new kind of Living Document, one that will be made possible by a coming tsunami of genetic engineering. Within a generation, or perhaps two, genetic engineers will be able to call into life human beings with any size brain that is structurally feasible on a planet of our gravity. I think it is reasonably likely that genetic engineering will also allow multiple heads on a single human with as yet unknown couplings. These changes will allow us to dedicate entire lobes to functions we now relegate to computer servers currently spinning their disks in our office basements. Living Documents may take up residence in living tissue. Given that the human race is currently at about an emotional age of, I'd say, four, I find this an unbelievably scary prospect. I much prefer that we continue to play with our highly hallucinogenic computers and their Living Documents.

cyberPRINT: Toward an Architecture of Being

"I have conceived the project of enveloping you with your own discovery."

—Boullée to Newton [Fig. 1]



Figure 1: Project for Newton's *Cenotaph* 1783 Étienne-Louis Boullée.

Introduction

Typically, cyberspace is thought of as the ultimate disembodiment. Many expound on cyberspatial opportunities related to freeing oneself of the body and materials. In these worlds, we become faceless and bodiless; orphaned from our tangible self. We are free to try on other selves and postures, experimenting and acting through other identities. We are also anonymous, losing our uniqueness and possibly our accountability.

Cyberprint provides a theoretical framework for exploring and inhabiting cyberspace with an identity. This identity is inextricably tied to the individual inhabitants because it germinates from their physiological signals. Our physical bodies inhale, they exhale, they beat, they sweat, they shiver. These functions are uncontrollable and necessary. They are also unique to our own self. If we incorporate the fundamentals of physical being to establish virtual being, to give form and space to personal architectures and avatars, we create a personal signature, a cyberprint. The cyberprint also sustains beyond our dwelling, leaving an imprint of our physical place in time.

The ancient roman poet, Ovid, stated "In medicine, as in life, until the mind has been prepared to see something, it will pass unnoticed as invisible, as though it did not exist." (Binns). *Cyberprint* attempts to bring this body architecture, the self atmosphere, to existence, making it visible and challenging our perceptions.

The question is then how do we reinterpret the elements of architecture (rhythm, light, texture, etc.) into a virtual world modified by and for our physiological being. We can begin by developing a language; naming the physiological data and designing the corresponding values. If we take a look at our bodies, they are constantly talking. Yet, we have only invented a few languages to communicate and understand what they are saying. We have learned to read some of the conscious messages such as postures, gestures, and sounds. The many untold stories lie in the involuntary actions of the body. Developing a language for the subconscious messages will offer communication of the self on a new level.

Traditions of Self-Portrayal

Throughout history, humans have developed culturally acceptable interpretations of the body and the subconscious self. These representations and performances, in turn, would teach us more about the body. Over 12,000 years ago, surgeons of the Paleolithic era performed trephination, a process where holes are cut in the patients' skull. This was thought to release evil spirits that cause disease. Three thousand years ago, Egyptian morticians removed the internal organs and filled the body with strong spices. They believed it was necessary to preserve the body for the soul to live on after death [Fig. 2].

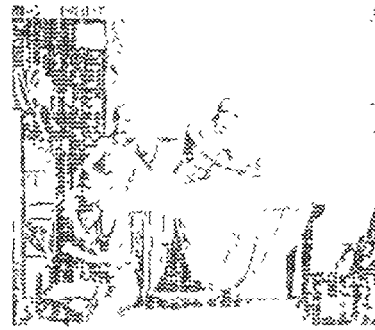


Figure 2: Embalming, Kittredge, p. 20.

These practices served as investigations, teaching the cultures something more about the body, altering their perceptions, and thus, refining their practices. It was not until 140 years ago that the Medieval practice of bloodletting to purge the body of impurities was renounced [Fig. 3].



Figure 3: Bloodletting, Guinness, p. 104.

Physiological Data and Architectural Metaphors (Language)

Today, we have an incredible, at least perceived, understanding of the workings of the human body. However, the only linguists are those in the medical profession. The language for organic structures (anatomy) is well formed through dissection, modeling, and imaging of the body with scans such as X-rays, CRTs, and thermography [Fig. 4].

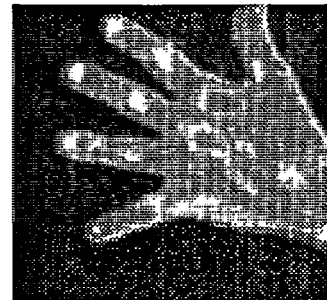


Figure 4: Thermography, Guinness, p. 24.

The language for body functions and physiology, which are processes and states, are not as well developed. For example, during anesthesia, the anesthesiologist watches over 30 interrelated variables charted as a 2-D wave-form data display [Fig. 5] to determine if a patient is stable and in the desired physiologic state. These human factors are continuously monitored and include: Pulmonary Function, updated each breath (Tidal Volume, Respiratory Rate, Nitrous Oxide, Oxygen, Carbon Dioxide, and Airway Pressure), Cardiac Output, updated each heart beat (Stroke Volume, Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, and Arterial Oxygen Saturation), Predicted Plasma, Brain, and Muscle Concentrations, updated every 2 seconds (Fentanyl, Propofol, Isoflurane, and Vecuronium), Fluid Changes (Blood Loss and Blood Infused), Urine Output, and Body Temperature.

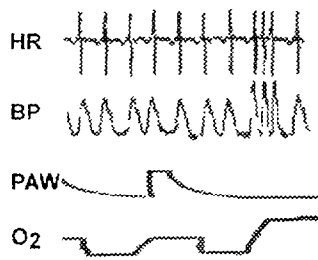


Figure 5: Wave Form Diagram, Westenskow.

All of these variables are interrelated and constantly in flux. For example, when air is inhaled into the lungs, pressure is exerted on the heart due to its close proximity. This pressure causes the volume of blood pumped by the heart to change with each beat. The current representation, which depicts them as isolated variables, does not show these relationships. It also does not accommodate a real-time history or comparison against normative values, useful for monitoring trends.

The standard physiological data monitored by an anesthesiologist, coupled with brain activity, can be used as the language building blocks for Cyberprint. These vital signs cover all essential human functions: breathing, heart, and mental activity. When these systems are then coupled with time, a three-dimensional construct is created.

Breathing: The Respiratory System supplies oxygen and removes carbon dioxide. Air flows through a series of conduction passageways that branch out from one another. Inspiration, the movement of air into the lungs with elevation of the ribs and expiration, the movement of air out of the lungs, back into the atmosphere with fall of the ribs creates a rhythmic pattern. This rhythm is altered from internal and external forces such as stress and physical activity.

Heart: The Circulatory System provides a homeostatic environment for the cells of the body [Fig 6]. Blood continuously travels a closed, circular route through the heart, into arteries, then to capillaries, into veins, and back to the heart. The heart is the pump that provides the force necessary to keep this blood flowing. Changes in the blood volume may be brought about by emotional states (fear), environmental factors (temperature), physical activity, and other variables.



Figure 6: Dendritic (Fractal) Structure of Brain Cells, Briggs, p. 125.

Mental Activity: The Central Nervous System is responsible for the integration and control of body functions [Fig 7]. Functions range from single activation and reflex control of skeletal muscle to complex functions of memory, abstract thought, association, and language. Throughout the body, nerves (somatic receptors) receive stimuli (change in the environment) and send the information to the central nervous system so it can react in a purposeful manner to changes in the external and internal environment. Exteroceptors are sensitive to changes in the body's external environment (pain, touch, temperature, pressure, hair movement). Interoceptors are sensitive to changes in the body's internal environment (stretching of muscles, the inner ear, etc.).

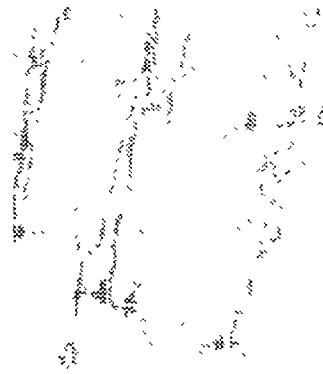


Figure 7: Fractal Structure of the Circulatory System, Briggs, p. 127.

The body's organic structures are easily visualized because they already possess their own characteristic shapes. The language results from enhancing a given set of representations. In contrast, physiologic data has no particular form. Representation must be invented. This brings us back to the age old question of how we represent the self. This is the design challenge of *Cyberprint*.

The three systems initiate germination in form, color, texture, light, and proximity. To create the cyberprint, a model for externalizing these three systems must be developed. The initial investigations utilized traditional architectural metaphors [Figs. 8, 9]. The roof, that which provides shelter, is externalized from the respiratory rate. Variables of heart rate make up the walls, which are necessary for roof support [Figs. 10-14]. The premise is two-fold. First, that everyone understands the basic requirements for a building. Second, if one system goes into failure, the others will follow due to their dependency. For example, if blood pressure begins to drop, the walls will collapse and the roof, breathing, will follow.

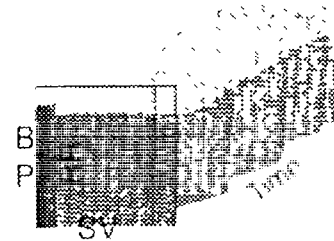


Figure 8: 3-D Wave Form Diagram

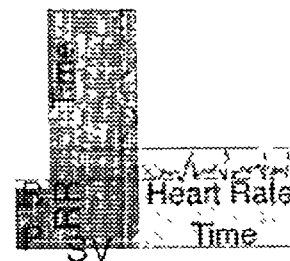


Figure 9: 3-D Wave Form Diagram



Figure 10: 3-D Wave Form Diagram



Figure 11: 3-D Wave Form Diagram

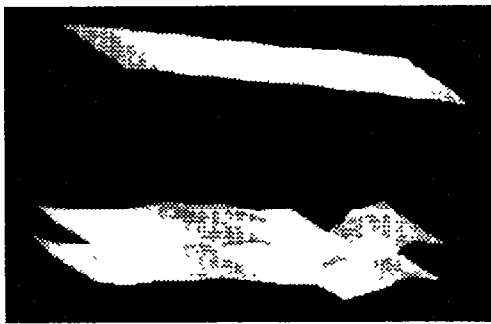


Figure 12: 3-D Wave Form Diagram

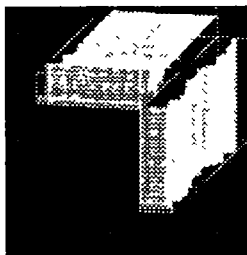


Figure 13: 3-D Wave Form Diagram

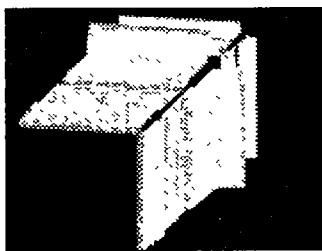


Figure 14: 3-D Wave Form Diagram

Another model for externalizing these three systems is where each system is given an initial "cell." The cell has certain properties based on the system variables (heart rate, blood volume, etc.) and can travel between ranges based on the present condition of the cell's variables. The cells are dependent on one another across the systems and will change in relation to each other. This is known as cellular-automaton simulation [Fig. 15]. Cellular automata are used to model the behavior of unpredictable systems. The behavior of the whole is dependent on the interaction of the individual cells [Fig. 16] (Friedhoff, p. 158).

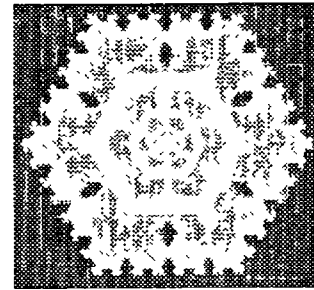


Figure 15: Snowflake Cellular Automaton, Friedhoff, p. 158.

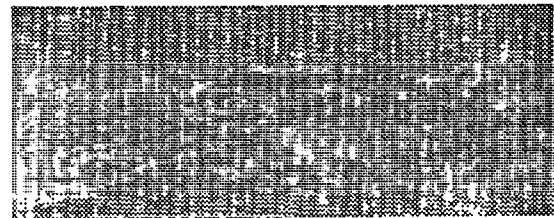


Figure 16: Gas Fractals, Bnggs, p. 135.

Each cell would be capable of multidimensional representations of the system data: X, Y, Z coordinates in space, color and shape, normal size (historical average) and fluctuating size (real time), speed, and sound. The cell's capability is defined from normative values and deviations or ranges of values. All cells will be portrayed against a "normal" value. These norms are used to apply intelligence to the environment. If a system falls outside the normal ranges, that particular cell's graphic representation goes to alert status by changing color intensity, speed, pitch, etc.

Cyberprint Environment (Design)

The language of representing the three systems creates a special mirror, a physiological based image of self. It provides a new medium, giving access to a part of the self previously unknown. Through virtual dwelling, we can begin learning to read our body stories and come to know the rhythms of our involuntary actions.

This will provide a connection between the body and the environment that is currently lacking in virtual architecture. In traditional architecture, we understand our environment through our bodies. This includes scale and memory of objects. From classical times onward, architects used the body as the measure of all things [Fig. 17]. Size, proportion, placement, and texture of all built things are understood in relation to body size. From 6'-8" door openings to pass through to 2-1/8" door handles to turn, we understand how the environment works by relation to our body. Our physical presence also leaves a memory in the environment [Fig. 18]. We see it in the raised grain on the chair arms and seat, the worn dips in the stairs, and the fog of breath on the window.

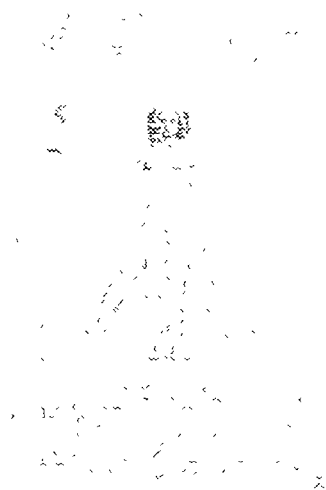


Figure 17: *Ideal Man*, Leonard da Vinci. Rasmussen, p. 115.



Figure 18: Detail of English walnut chair, Rasmussen, p. 179.

In cyberspace, there is no inherent scale, materiality, direction, or body. We lose the clues from objects as to if we walk through or turn to open with our hand. There is no wearing of surfaces through accommodation of bodies. *Cyberprint* brings the body into virtual architecture, providing a new type of scale and reference to the body. Personal signatures or avatars and environments are created with an inherent reference to our physical bodies. The environment is now made by and for our body rhythms. We feel the fit within a virtual space made to accommodate them.

Through sustained inhabitation, *Cyberprint* allows our presence to create memories in the virtual environment. The repetition of variables will alter the environment, crystalizing an edge or extending a vista. Interaction among *Cyberprint* will compound this affect, creating communal spaces.

Our individual *Cyberprint* will also be influenced by existing *Cyberprints*. Awareness of, or proximity to others will change our signature. This may be undesirable. In public settings, we make self-conscious efforts to control our presentation of self; we manage the impression we make on others. In a consensual virtual environment made up of *Cyberprints*, we may want to do the same. Filters can be introduced to alter our presentation of self; the *Cyberprint* accessory. They may have the equivalency of self restraint, keeping us from communicating our true feelings. The filters may also be superficial, equivalent to lipstick and perfume.

Filters could also serve to interpret our physiological data differently, through new rules. They may focus a particular physiological aspect such as breathing, to be used for meditative purposes. Filters may also reinterpret our physiological data to represent other animate forms. We could try on other *Cyberprints*, say that of a heavy smoker, or of a Doberman, to experience the virtual environment from a new perspective. This takes us full circle from the introduction, where *Cyberprints* is striving against the bodilessness and loss of self in virtual environments that allow for this play. However, *Cyberprint* and *Cyberprint* filters now can give us this multiplicity of self with the inherent tactileness of the body in the environment.

Futures (Critique and Redesign)

The final images shown [Figures 19-26] were generated in real time with actual data of physiologic states using Microsoft Data Explorer software. The forms (ground) are the actual data as it unfolds, the dancing of the body rhythms. The background is the two-dimensional normative projection, warped by the weight of the undulating forms.

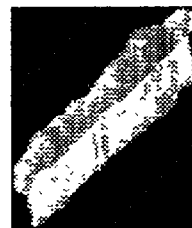


Figure 19: 3-D Modeling of Physiological Data, Agutter.



Figure 20: 3-D Modeling of Physiological Data, Agutter.

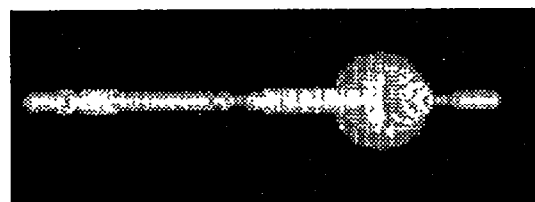


Figure 21: 3-D Modeling of Physiological Data, Agutter.



Figure 22: 3-D Modeling of Physiological Data, Agutter.



Figure 23: 3-D Modeling of Physiological Data, Agutter.

Cyberprint creates a stochastic, fluid environment that originates from the data naturally generated by living individuals. It is a real time phenomenon, displayed in immersive or desktop digital environ-

ments. *Cyberprint* is still in an infantile state. This work requires interdisciplinary research among usually isolated fields; architecture, music, computer science, and medicine. The challenge to date has not only been the interpretation of the physiologic data into



Figure 24: 3-D Modeling of Physiological Data, Agutter.



Figure 25: 3-D Modeling of Physiological Data, Agutter.



Figure 26: 3-D Modeling of Physiological Data, Agutter

corresponding visual and aural representation, but also the design of the hardware that recognizes, captures, and transforms the necessary information into digital output and the software that takes on this input data and manifest it in a fluid audio-visual expression.

Using Descartes' terms, we understand behavior as reaction to outside events. *Cyberprint* layers on this an architecture as reaction to behavior. Like Ovid's quotation, new technologies lead to new understandings of certain phenomena because they provide visualization tools. The invention and refinement of the microscope in the 1600's led to new understanding of body functions (Kittredge, p 21). Perhaps *Cyberprint* will also lead to new understandings and advance our perceptions, not only of architecture but of our selves.

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Into The Belly of the Image:

Historical Aspects of Virtual Reality

Today, Virtual Reality is seen by many as an entirely new phenomenon. However, the idea of transposing the audience into an enclosed, illusionary visual space was not born with the invention of computer-based Virtual Reality. VR revives a central idea about the connection between man and picture, and is a constant phenomenon which can be traced back to Antiquity.

Illusionary Spaces of 360°

Virtual Reality can mean, for example, an area of ritual action, a private, artificial paradise or a public sphere of politically suggestive power; important aspects of the idea can be explained by focusing on historical examples – a visual history, the symptom of which is totality.

Already in late republican Rome, in the second Pompeian style, there were wall-paintings which extend the room by an apparent opening of the wall representing actual views into other spaces. A particularly forceful example is shown in one of the most famous frescos of antiquity in the *Casa dei Misteri* at Pompeii dating from 60 B.C. (Figs. 1&2)

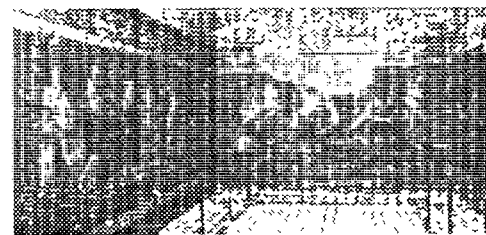


Figure 1



Figure 2

The audience finds itself amidst a series of life-sized, highly realistic figures. Some appeal directly to the recipient, others communicate with each other, from wall to wall, across the real space. The borders between visual and actual space seem to dissolve, the figures move apparently in real space. Visitors to this room are trapped in the gaze of the figures which hit from all sides and don't let go. The illusionary space surrounds the spectators entirely, 360°, fixing them all into the same place and time.

This is the initiation or cult room of a Dionysian community in the visual presence of Ariadne and Dionysos a mystical consecration is being prepared: women, filled with divine presence, make sacrifices, servants unveil an erected phallus, the *liknon*. A female initiator, expectant and frightened by the Epiphany and a dancing Bacchant covered only with a veil are represented. At the centre of the bacchanalian rites are *ek-stasis* and *en-thusiasmós*; physical and psychological frontiers are torn down and filled with the divine in order to dive into a precivilisatory world.

The frieze bears witness to a Virtual Reality which was meant to encourage the audience towards attaining an emotional, ecstatic participation, through the use of suggestive visual means, such as the totality of the representation, the choice of colour and the dramatic gestures, thus creating a fusion of audience and image in cult.

In the Renaissance illusionistic spaces were in great demand: the *Villa Barbaro* in Maser or the virtual pilgrimage at the *Sacro Monte* near Varallo are just outstanding examples. Remarkable is the *Sala delle Prospettive*, [Fig. 3] created between 1516–18 by Baldassare Peruzzi, on behalf of Agostino Chigi in the *Villa Farnesina* in Rome. Chigi was a *nouveau riche* desperate to secure his reputation and name largely by obsessive patronage. Peruzzi encircled the audience with the fresco of a virtual columned hall, painted in perspective, which offered illusionistic views of Rome and its surrounding countryside. A panoramic-effect was produced, one so impressive that it was admired by Serlio, and according to Vasari, Titian was unwilling to believe that this was a painting.



Figure 3

The view of the landscape contrasts with the monumentality of the illusionistic temple hall. The splendid isolation of this architecture creates a feeling of the sublime, only matched by the view from the top of a mountain; Chigi's poet Marcantonio Casanova compared the Farnesina, which he said was destined by Chigi to be the residence of the Gods, with the Olympian palace. This vision of Antique grandeur, represents Chigi's earthly longing for eternal divinity.

The decorative ceilings of Baroque architecture, for instance at *San Ignazio* in Rome, create illusionistic spaces [image 4] and during the 17th and 18th century in the palaces and country houses of the aristocracy hundreds of illusionary spaces were created.

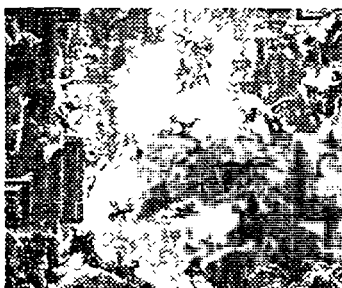


Figure 4

The Panorama

At the time of the Industrial Revolution in England, the new image-machine, the Panorama, achieved hitherto unknown dimensions of the illusionary effect [Fig. 5]. The audience is immediately surrounded on all sides by a three-dimensional interior, the *Faux Terrain*. This is imperceptibly connected with the two-dimensional, visual action, and it often makes the visual frontier untraceable. Especially because of the "magical" luminosity of the images, which comes from a hidden source of light, the visual space itself appears to be the source of reality. This representation of nature gave the vision

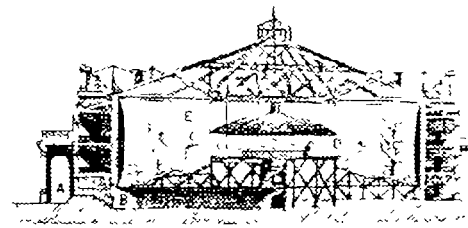


Figure 5

totality and allowed journeys through space and time – a complete universe of illusion. The Panorama spread successfully with at least 100 million people visiting this massmedia making it a focal point of the picture in the industrial era.

Similar to modern fears of the simulator sickness, the Panorama was criticised mainly for psychological reasons. It was argued that the Illusion could result in an inability to perceive reality. Both the military leaders of France and England, Napoleon and Lord Nelson, soon realized its potential as a medium for propaganda. In Germany it was much later, after the 1870/71 war with France, that it was first used for political propaganda. A paradigmatic representative was the *Panorama of the Battle of Sedan*, opened in 1883 in Berlin [Fig. 6].



Figure 6

The monumental picture – the screen measured more than 1725 m² – transported the "military birth of the Empire" into the very centre of urban Berlin. For the opening ceremony the Emperor Wilhelm and the most powerful figures of the German Empire were demonstratively present. The picture gave an almost photo-realistic portrayal of the action: on the three-dimensional battlefield, bushes, stones and entrenchment, real weapons and cardboard soldiers could be seen.

Today, our eyes are used to following an increasing acceleration; thus we can hardly appreciate the effect which a steady panorama picture had at that time. Many witnesses attest that for the first few moments the deception was so strong that the luminous scenery was experienced as a real battle. The press headlines spread this news all over the country. The picture was not experienced as a self-contained object, because everything was picture. It is as if one were standing amidst the awful battle. With the calculated precision of illusionism the picture and the 3D-interior concentrate and fix on the onlooker. He/She is devoured by the image. This prodigious, pseudo-religious experience was meant to implant an unforgettable collective memory.

The artist Anton von Werner always proclaimed the truthfulness of the panorama, which, he said, was based on a careful scientific reconstruction. The state was mainly interested in sanctioning a pictorial truth and Wilhelm's patronage implied the sincerity of a *Vera Icon*, although neither he nor Werner had witnessed the actual events. However, this apparent authenticity was pre-arranged and aimed at glorifying the Prussian soldiers. The Prussian-aggressor is shown so to speak *Wilhelminian politically correct*, as a defender.

Interestingly enough, since the 1980s, dictatorships (for example, in North Korea, China, Iraq, the former USSR, and Egypt, have increasingly revived the battle-panorama, as a means to enhance national unity.

Virtual Reality

Since I discovered some years ago this unresearched image-tradition, I realized that the total images of VR are no intellectual novelty. The history of VR can be traced in all art-historical epochs and media. From the wagnerian concept of the *Gesamtkunstwerk* to Monet's impressionistic-immersive panorama of waterlilies, Prampolini's futuristic theatre-concepts, Eisenstein's theories about the multisensual 3D-Movie to Yongblood's *expanded cinema* of the 1960s. Technologically the development continued with the *Stereoscope*, *Cinéorama*, *Cinerama*, *Stereoscopic Television*, *Sensorama* and the *Circular Cinemas* of the fun fairs. All had the same aim: to transpose the onlooker into the image.

With the military invention of the HMD and the *Dataglove* for the first time in its history the image could be entered. Constant recalculations make the computer-image transformable: they create the option that the pictorial action could answer the action of the user only limited by the restrictions of

the programme – the interaction.

VR marks the seeking for an interface in which ideally all senses are appealed to and occupies immediately and physiologically-imperceptibly as possible, as if it were a real experience. The current renaissance of the classical alliance of art and technology in the postindustrial societies has developed the profile of a few artists who work in this transcultural global scene. The first glimpses of this neoillusionistic genre are the pioneering works *Osmose* by Char Davies, and *A-Volve* by Christa Sommerer and Laurent Mignonneau, which represents a new level of interaction.

Osmose (Fig. 7) represents a visually powerful simulation of a dozen nature – and textspaces. Weightless and solitarily like a diver the observer glides through opaque fog banks, abyssmal-oceanic depths, glinting dew, translucent swarms of insects the thickets of dark woods and eventually into the microcosm of an oak leaf shimmering like an opal...

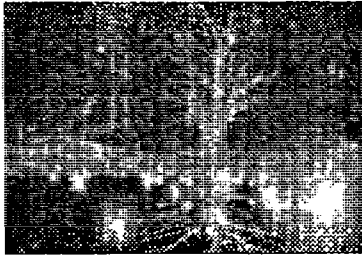


Figure 7

The transitions between the worlds are soft and fluent as if seen through a soft-focusing lens, with phosphorescent light points glimmering in the dark opening up richly-facetted associations. *Osmose* is a sphere mineraly-hard yet fluidly intangible, a non-cartesian space.

Despite being a technically illusionary picture, *Osmose* suggests an optical poetic atmosphere. Nevertheless, the artist doesn't aim at replacing nature: Her vegetable representations neither brush the chimaera of digital realism, nor do they appear abstract.

Above all, Davies's desire to develop a *natural interface* must be considered explosive. Immersants control their navigation through the dataspace with a chesthugging leather vest containing sensory devices sensitive to the body's breathing. With filled lungs, just as in diving, one rises. A concentrated, even breathing results in the impression of balanced motion.

The result of this finely-tuned and body-intimate synthesis of technology and organics is a strong feeling of bodily presence causing a corresponding emotional mood. Many participants speak of an often contemplative tranquility, and a mild security. I had the impression that some participants even testify to a trancelike condition. This vocabulary, bordering on the esoteric, does however testify to a central effect of virtual reality: that suggestive presence in a total picture – the cocooning-effect as Joseph Nechvatal has called it – causes in *Osmose* a mental, a meditative immersion. This notion of virtual reality is the strength of this work.

The Enlivening Effect

The effect of presence in *Osmose* is intensified by what Heeter called *social presence*: when agents in the virtual space act like individuals. The higher the degree of correspondence between perceived actions and probable phenomena, the more likely it is that what is seen, as in the Panorama, will be taken for real. VR-research follows this belief into every banal detail.

A-Volve by Sommerer and Mignonneau [Fig. 8] presents for the first time an opportunity to create virtual beings and to interact with them in realtime.



Figure 8

The guiding principle is the *survival of the fittest*. Certain creations swim faster, are better able to

assert themselves against others and are able to pass on their genetic make-up, including any mutations, to their descendants.

The onlookers can "play God", creating new beings or bringing the simulated biotype under their influence: By slightly stroking the water – a natural interface as well – the creatures can be attracted, trapped, manipulated or even killed. Through an identification with the creatures, *A-Volve* reduces the distance between life and A-life.

A-Volve's evolution is founded on genetic algorithms. The procedural principles of evolution, such as selection, crossover and mutation are applied innovatively and efficiently to develop a homogenous and uniform optimum in the creatures adaptation

Evolution creates pictures of an unpredictable, transitory and unique nature and its impact on the system of art emerges: the variety in forms that might evolve during these processes is theoretically unlimited. The more complex the accidentally grown structures are, the more intensely the pictures seem to "live" – not finally terminated, but changeable, adaptable, even able to "learn" under cumulative methods of selection.

In earlier papers I described the consequences of interaction.³ With evolution the suggestive potential of the picture has to be defined on a hitherto unknown level. A dialectic relationship with the machine seems possible. Here, interaction is not only about a freedom of choice for the player, as Flusser noted, but about unexpected change, where the user must react to the change. Finally, the implementation of evolutionary models into a virtual culture supports the illusion of life. Evolution removes conceptional control from the artists, making them passive witnesses to random changes, which the user can select like a breeder.

But it has been argued that the audience becomes emotionally involved when a balance is created between the freedom of interaction with interesting characters and the dramatic plot, which has to be followed. Thus, the system can manipulate the interactor even without him becoming aware of it. Psychobiological tests show that the higher the involvement, the less the ability to differentiate between the calculated world and personal experience. It is the distribution of endorphine that causes a *technical high*.

Whatever one might think about scenarios of this nature, it seems clear that virtual culture will not experience its most intense thrust in the direction of illusion by hardworking ardent engineers calculating each and every detail but by combinatory processes generating unforeseeable forms.

Interfaces

The "living" virtual picture space, which is the aim of current research is better experienced the more real and the more natural the connecting interface is. The more bodily-intimate the interfaces nestle into the senses, the more distinct not only the danger, that the *technological iceberg* remains sealed to the user but the more intense the illusionary dispersal with the total dataspace, the immersion. Virtual Reality has at its core the complete disconnection of human senses with nature and matter and is so far, the strongest challenge of illusionism. Everything becomes image. The increasing processor-capacity raises the suggestive potential, which just by the ideology of a *natural interface* unfolds its complete psychologically manipulative effect. Seen on the background of illusionism, the intended abolition of the interface becomes a highly political question. In the animated virtual environments a very fragile centre of art is put into question: the gesture of distance by the recipient, which allows critical reflection in the first place. The further the illusionary symbiosis between work and onlooker makes progress, the weaker the psychological distance. Without distance the work cannot be perceived as an autonomous, aesthetic object. It was Ernst Cassirer as later Aby Warburg in his *Mnemosyne Atlas*, who stressed the intellectually productive, awareness-raising power of distance: Adorno, Gehlen and Foucault develop this aesthetic paradigm. As much as the subject might crave to overcome the barriers and abandon itself, subject-forming depends on distance. Traditionally, as Serres writes, the onlooker mentally activates the elements of fixed artworks, VR and evolution however, turn this concept on its head, moving first the objects and thus the onlooker.

More and more people receive machine-made illusionary spaces, the function of which have a historic continuity stretching from Pompeii to the present. VR reveals itself as the technically-developed heir to illusionism as it made itself felt in its paradigmatic representative, the Panorama. Although the audience can exert its creative powers over the image, this is opposed to the highly suggestive powers of the image itself. Maybe we are regaining a relation to the image that reaches far back into its pre-civilisatory history: a power of the image that supports a psychical as much as a physical lack of boundaries and lets us regress, leading to an ecstatic symbiosis of onlooker and vivid image.

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"Intelligent" Architecture: Cybernetic Theory and Architecture

Introduction

The paper discusses current descriptions of "intelligent" architecture and proposes the relevance of cybernetics in affording an alternative criteria for its conception and production. The recent appearance of what has been cited as a 'new genre in architecture' includes buildings which have various levels of automated and computer controlled functions—"robotic" infrastructures. Information Technology and Communication Systems have since the 1960's aided new conceptions of architecture and fuelled speculation concerning architecture's future development. Contemporary, architectural discourse now includes artificial intelligence in the technological debate, contributing another dimension to the modern, *machine esthetic*. Current descriptions of "intelligent" architecture are consistent with a model of artificial intelligence which has been generated by the predominance of the electronic, digital computer and the prevalent symbolic and logic driven descriptions to which it adheres. Consequently, the existing "intelligent" building is unable to achieve better performance over its initial, well defined specification and is incapable of interacting with the world as an autonomous entity. The cybernetic concept of an "intelligent" building demands some degree of epistemic autonomy in order to improve itself, a capacity which is only attainable through structural autonomy, as is the case with all biological systems. The development of "intelligent architecture" as an informationally open, organisationally closed, cybernetic system is discussed in relation to existing extensions of "robotic" technologies in architecture. Interaction, a fundamental characteristic of intelligent, decisionally autonomous and unpredictable living systems was explored by cybernetician Gordon Pask (1928 – 1996). His work is compared here to the pre defined, receptor-effector devices currently in use in order to highlight the limits of existing adaptive machines and to suggest the relevance of his ideas in providing an alternative, human-centred design methodology.

"Intelligent" Architecture?

At present, "intelligent" architecture is a description of any structure in which some or all of the buildings services are automated. Services are such things as heating and ventilation systems, transportation in the form of lifts and escalators for circulation of people and products as well as security or safety mechanisms for efficient damage limitation in the event of theft, vandalism or fire. In a number of "intelligent" buildings, services are centrally controlled by an electronic, digital computer programmed to manage all functional requirements. The computer operates in communication with a number of other mechanisms such as thermostats and valves, necessitating the employment of transducers to convert the pneumatic signals of these and other devices to the computers digital signals and back again. The complexity of these hybrid systems, in conjunction with the large number of individual components needed, has proved to date to be expensively inefficient. In order to avoid the problems created when centralised, computer control breaks down (an apparently frequent occurrence), a network of individually powered micro processors each carrying their own battery pack has been employed as an alternative method to monitor internal conditions and operate equipment in a building. Both methods involve digital transmission and reception of signals to a number of different "point" and by a number of different means, involving experimentation with coaxial and fibre optic cable, telephone lines and microwave or radiowave links in order to facilitate faster and more precise information relay.¹

The implementation of elaborate servo-mechanisms as discrete, unitary elements housed in otherwise static, "dumb" structures or their utilisation as modular components of some infrastructural mechanism demonstrates the deficit in integrative design strategies to date. As a result the architectural question is currently in danger of being neglected in favour of a technical elaboration of its functional parts. The confusion made evident in architectural discourse by its uncritical adoption of the term "intelligent" in relation to buildings with a high technological investment reflects the differing criteria of a number of contributing scientific fields. This can be seen in the wide variety of terms used to describe "smart" material systems and structures, terms such as adaptive, active, sensory, sensitive, metamorphic and intelligent. This diversity attests to the research communities struggle to define an appropriate set of criteria concerning the development of "smart" science and technology in order to focus attention on the premise or defining principles for "smart" as opposed to "intelligent" innovations. The emulation of the adaptive capacity and integrated, interactive characteristics of biological systems is commonly considered to be the ideal goal of this new discipline and one which emphasises a holistic or systemic philosophy. "Smart" scientist Richard Gardiner has suggested that "It is in this way that our synthetic world will be guided by the same philosophy as our natural world."² He considers that "smart" innovation represents a physically realisable compliment to research in the area of complex, adaptive systems or Artificial Life (AL).

The technology to construct "robotic" (bionic) environments already exists or is in an advanced stage of development but there is nothing as yet that challenges our concept of self - who or what we are

in current examples of so called "intelligent" or "smart" buildings. These structures can not anticipate our changing, individual, human needs or communicate with us in a relational context. Robotic processes are fixed, and unambiguous as are "smart" materials and structures. The 'receptor - effector' devices currently employed in the built environment react only within pre defined parameters, optimising their performance within given percept and action categories. Such systems improve upon their initial designs by altering their decision functions contingent upon evaluation of past performance, they have decisional capacity but no "decisional autonomy." Robotic tasks are necessarily definable, distinct, predictable; they evince reason in their behaviour and one need not look beyond a robots behaviour to determine its intention ... there is nothing about "robotic-ness" that entails *mindfulness*.³ The modernist conception of dwelling as a "machine for living" has not yet made a convincing translation to a late twentieth century conception of dwelling as "living machine."

A Cybernetic Approach: the Work of Gordon Pask

The hybridisation of architecture into an "intelligent, living machine" represents an opportunity for collaborative discourse which demands a meta language for its conception and a trans-disciplinary design strategy. The limitations affecting contemporary machine learning suggests the need for more inductive approaches to artificial intelligence and Cybernetics is proposed as affording a more cohesive and design orientated approach than is currently available.

The "intimate relationship" of cybernetics and architecture that cybernetician Gordon Pask advocated some thirty years ago, anticipates the increasing importance of human machine interaction in facilitating new psychological and physical environments. He influenced a generation of architects through his consultancy at the Architectural Association in London from 1961 – 93, the most notable being Cedric Price and the "Fun Palace" project as well as individuals such as Peter Cook and Ron Herron former, founding members of "Archigram". Pask claimed that cybernetics and architecture shared a common philosophy of operational research. These terms had been previously outlined by Stafford Beer who observed that "architects were essentially system designers who would need to take an increasing account of the organisational system properties of development, communication and control".⁴ The cybernetic conception of architecture expressed by Pask in relation to Beer's initial comments implies a broader conception of architectural design as "esthetic communication". He proposed that cybernetics may be seen to be advanced as a new theoretical basis for "intelligent" architecture and as a metalanguage for its critical discussion. John Frazer has summarised his own version of a cybernetic architecture inspired by Pask's theory as having "... an open relationship with the environment, in both a metabolic and socio economic sense. It will maintain stability with the environment by negative feedback interactions and promote evolution in its employment of positive feedback. It will conserve information while using the processes of autopoiesis, autocatalysis and emergent behaviour to generate new forms and structures. ... Not a static picture of being, but a dynamic picture of becoming and unfolding – a direct analogy with a description of the natural world."⁵

During the period 1950-58, Pask constructed a number of electrochemical devices having emergent, sensory capabilities. His intention was to construct a machine that would create its own "relevance criteria" by evolving its own sensors "to be able to choose, independent of the designer those aspects of the external environment to which it would react."⁶ Unlike any other existing and well defined machine, the device was envisaged as being able to adaptively construct its own perceptual categories and create its own means of interacting with the environment. A number of assemblages were built as a course of experiments in finding an appropriate medium for self-organisation to occur. By passing current through an array of platinum electrodes immersed in a container of metal-salt solutions such as ferrous sulphate, Pask was able to form dendritic metallic threads which could be manipulated in their structural growth. Fluctuation in conductance was aligned with particular environmental disturbance in order to direct thread structure growth, promoting emergent sensory awareness by rewarding the systems development through variation in energy supply. In 1958, Pask succeeded in developing a working device which demonstrated that ferrous threads could be adaptively grown to become sensitive to sound and magnetic fields. We have made an ear and we have made a magnetic receptor. ... The training procedure takes approximately half a day and once having got the ability to recognise sound at all, the ability to recognise and discriminate two sounds comes more rapidly. ...⁷ The capacity of the assemblage to interact with the world, to classify the apparent state of the world based on this interaction ... to make measurements, to draw distinctions to form concepts by physically evolving its own observables" is described by Peter Cariani as being a significant unique contribution to the field of artificial intelligence.⁸

Pask believed that humans are essentially "learning machines" (systems), and that this "need to learn" impels us to seek out novel experience. This is found in events or configurations which engender uncertainty or ambiguity, necessitating abstraction and conceptualisation in an attempt to interpret "the new" in relation to an existing body of experience — knowledge. The propensity to explore, discover and explain our environment involves social communication and cooperative interaction with each other in creating requisite novelty and variety resulting in the development of, what Pask refers to as, "aesthetically potent environments". Such environments are perceived by Pask to arise from both the production and appreciation of Art in its many manifestations. It is considered to facilitate a

dynamic information structure in which we are able to learn and to interpret at various levels of abstraction. Depending on the sense modality (medium) used, different levels of interaction do occur but are perceived by Pask to be generally dependent upon adaptation on the part of the viewer, reader or listener "our internal representation of a painting, (play or musical piece) ... does respond and engage us in an internal 'conversation' with that part of our mind responsible for immediate awareness" (9). ... does respond and engage us in an internal "conversation" with that part of our mind responsible for interpretations or discourses and affords greater ambiguity and indeterminacy. "It may in addition respond to a man, engage him in conversation and adapt its characteristics to the prevailing mode of discourse" (10).

This notion is embodied in *Musicolour Machine*, which Pask constructed together with fellow student T. Robin McKinnon Wood at Cambridge University. Built and performed by 1953, *Musicolour's* interactive program elicited attention (input) by interjecting in live, musical performance with responsive displays of coloured lights. By inducing human response it was able to incorporate variation in to the musical interpretation learning to "listen effectively" in order to respond and participate. The learning capabilities of *Musicolour* involved an anti inertia program which in the absence of input, or if given a repetitive input became "bored" and directed its attention to the potentially novel. In this way the machine was "designed to entrain the performer and to couple him into the system." ¹¹ Converse participation was enabled at various levels of interaction e.g. performers could accentuate properties of the music by reinforcing audio visual correlations in the process of improvising new musical compositions. The close, co-operative rapport that this engendered between the human and the machine was demonstrated at a number of public events between 1953 and 1957. The significance of *Musicolour* is not only in its achievement as a technically proficient, adaptive system but more pertinently in its particular ability to genuinely participate in the creative process. Its capacity to and "ad lib." (to improvise) was so effective that it lost its distinction as a detached entity in many of the participating musician's conceptions during such performances. ¹²

Colloquy of Mobiles was a socially orientated, interactive environment, designed by Pask in 1967. It consisted of a set of suspended, communicating entities able to emit and recognise several different colours and time modulations of light and a number of different tones and time modulations of sound. The community of five mobiles, run asynchronously in parallel interacted with each other via a conversational strategy involving a complex auditory and visual language existing at several different levels. The syntax of the interpretation depended upon rules built into each mobile's program so that different levels of communication occurred in which each mobile retained a certain individuality. Male mobiles were assigned as having two "drives," or goal-orientations and in order to facilitate these goals the male mobile had to elicit the co operation of a female, rotating in territorial competition with other males in the search for a willing participant. Receptor and effector devices were triggered by sound and light signals involving complicated correlations consisting of temporal delays or extensions as each mobile selectively reinforced particular communications with each other and apparently at will. The intriguing nature of the mobile community elicited considerable curiosity from human participants who were introduced into the environment. Interpretation of the system involved a number of individual gambits which usually entailed attempts to synchronise certain correspondents so that a pattern of communication or what may be alluded to as a "conversation" was achieved. ¹³

Conclusion

Pask's work involving the construction of adaptive systems involved the development of a number of elaborate programmes in order to regulate learning, innovative processes, and perception in individuals and groups. This work represents a substantial contribution to ideas of self-organisation in models of mentation as well as insights concerning the activity of sociological systems finding its apotheosis in Pask's "Conversation Theory." It is in essence a theory of interaction in which psychological (*P*) and machine individuals (*M*) participate, creating in the process, a conceptual domain in which new perceptions evolve. Pask believed that "from this mutual accord there could emerge a metamorphosis, a transformation both of the human mind and of the nature of computing ...". ¹⁴ This conception is apparent in the interactive environments perceived by Pask as places with which the inhabitant cooperates and in which she can externalise her mental processes. In this way the "living machine" will elicit our interest as well as simply answering our questions. Mutual adaptation is emphasised as compared to mere reaction, providing a model for "Intelligent Architecture" which supersedes current descriptions of "dumb" structures housing intelligent components i.e., human beings. Pask contended that many human activities are symbolic in character and by using visual, verbal or tactile symbols man perpetually "talks" with his surroundings. The proposition that a structure may be designed to foster a pleasurable and productive "dialogue" is described in part by the interaction exhibited in *Musicolour* and *Colloquy* in furnishing such an environment. This interactive process can be refined and extended with the aid of developing technologies in offering new mediums of communication. As suggested by Pask the relationship between the individual and the environment is an information processing system and if we are going to design for this situation then we must deal with the system as a whole.

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Art, Media, and Power

Art is always a product and a response to the challenge of its social and technological surroundings. The state of civilization has a great impact on consciousness which is a base for art activities since we are being constantly transformed by our own inventions (Kerckhove, 1995). This process of transformations creates also a new, widened environment for human beings, in which the biosphere has been complemented by the technosphere.

Nowadays, we are facing an enormous development of digital, information and communication technologies. Together with numerous phenomena which are the products of activities belonging to the bio-technosphere, those technologies build a complex corpus named cyberculture. In this context art has an important, critical role to play. Especially (multi)media art can serve as experimental laboratory, not only for new technologies but, first of all, for studies on the new social relationships created or encouraged by those technologies. Media and multimedia information and communication technologies bring along new problems, questions and threats. Art, on the other hand, undertakes efforts to examine this newly arising area which is at present often called a post-biological syndrome (Ascott, 1997). To say this in other words, artists not only use media technologies, but also examine them. In this sense, the new (multi)media art can be considered as a successor of the avant-garde movement. And since media technologies are first of all means of communication, the reflection on the medium leads in a natural way to the reflection on the processes of social communication, and on the new communities built on those processes. Expressing their doubts and anxieties artists ask about an impact of media technologies on social communication, roles and identities. They also ask about consequences of the development of virtual worlds. Overcoming the social fear of technological world their works question in the same time the Utopia of the Electronic Paradise.

There is a great variety of problems, issues, and important aspect which (multi)media artists elaborate in their products. In my paper I would like to concentrate only on the syndrome: art-media-power. I would like to explore the implications of the development of interactive media through the analyse of artworks. I am interested in the issues that show the way in which art has been transformed by invasion of (multi)media, digital technologies, and how those processes of transformation are related to the problems of power and authority. I address those reflections to the works of some media artists coming from different periods and different countries in order to show how different political, economic and technological contexts create different ways of approaching media.

The most important issue provided by (multi)media art is for me the problem of the control, especially if we take into account the number of powerful works and important artists dealing with this theme. This current in art must have emerged logically from the interest in characteristics of electronic media, from the reflections on obvious and hidden attributes of communication technologies. There are many aspects of that theme: the control of an artist over his/her creative process and its result - an artwork; the control of a receiver over his/her perception and an artistic phenomenon being experienced; the control of an artwork over a viewer/user/participant; the control of the art establishment (art market, galleries, museums, etc.) over an artist, the control of different power holders, different forms of authority over individuals and the society. This artistic praxis seems to

meet our deepest needs. We need to know what regimes of power and in which way use media technologies in order to fulfil their purposes which not always can be identified with ours (Wark, 1995). A few years ago the "Ars Electronica" festival focused on media acting out of control. However, we know very well that if it is easy to loose control over electronic media technology, it is much more difficult to liberate from its control.

Contemporary multimedia art, both materialized in the real space as installations, as well as virtual ones situated in the cyberspace of the Internet, frequently raises issues of power, control, and subordination. It is certainly so, because electronic technologies, being employed by art as new means of expression and being often perceived as a safeguard of the freedom of expression and communication, may be used as very efficient means of surveillance, enslavement and suppression. Concern with the nature of a used medium or, in other words, the meta-discourse approach, which characterises radical artistic activities, makes artists perceive various aspects of the dual nature of electronic media. The artists probe the syndrome of ambiguity and, as a result turns our attention to threats and promises the new medium presents. Certain works of such artists as for instance Simon Biggs, Vera Frenkel, Lynn Hershman, Antonio Muntadas, or Miroslaw Rogala may serve for interesting examples of varied, self-analytical references to the medium and its complex associations with axiological and ethical spheres. Let us look at few examples.

Shadows (1993) – interactive environment by Simon Biggs focuses on the relationship between a viewer and the artwork. Interactive process between them develops into a game in which domination seems to be an award for a winner, and subordination left for a loser. Seeking power and a struggle for control appear as main rules of the game. The viewer involved in this game faces however the possibility of self-recognition, self-identification, and in result – the opportunity to withdraw from this polarisation.

Works of Vera Frenkel are intangibly linked with a group of concepts and related subjects. Central to them is the concept of identity. Identity is of subjective nature, nonetheless, it is socially conditioned. Therefore it enters a close relationship with media technologies that have become means of communication between an individual and different communities. Therefore this individual face a problem of control which s/he must gain, or, more often, which must experienced. An individual remaining in a technologically mediated relationship to the others takes a risk of being misrepresented. In consequence of this misrepresentation an individual may develop a communication disorder and end up in loneliness, alienation and deprivation. However, various forms of power, state power being one of the most dangerous of them, may constitute a threat to individual creative activity of the same or even larger gravity than a danger of misrepresentation. Tapes by Vera Frenkel, for instance *The Last Screening Room*, *A Valentine Day* (1984); *The Contraband Tape* (1984) and *The Business of Frightened Desires (or The Making of a Pornographer)* (1985) illustrate this issue.

One of the basic forms of individual creative activity is art. Subjective identity is expressed in (and is build by) art. Art plays a part of a communication means between us and the others. Finally, it is subjected to varied reactions from the ruling power. A popular form of this kind of reaction is censorship. It is a manifestation of control over art exercised by the state and its institutions. It is also an institutionalised form of violence. Several tapes by Vera Frenkel give a matter to this issue. In addition, they visualise cognitive and ethical dimension of art. The point is that it is art which is able to articulate true opinions, therefore it is obliged to do that. The necessity of making a choice places the artist not between the true and the untrue but between the truth and the lie. And while it is not easy to say whether what we say is true or not, we usually lie consciously. And here we find the responsibility of an artist against his/her work and at the same time against the world.

The Internet work *Room File* by Antonio Muntadas is another example of the interest in the problem of censorship. This is actually a database collecting different cases of censorship applied to art. Each user has not only possibility of getting acquainted with the content of the database, but also can add new cases. Interactivity which is the attribute of this work extends the field of control that the work is concerned with. *Room File* deals with control over art, as well as with with control over art controlling.

The works of Lynn Hershman also build situations of reception which exceed the limits of the internal art context. Like those mentioned above they are not concerned merely with the problems of art. Hershman's works belong to a space where the questions of aesthetic come into contact with social problems, and their message relates them to the feminist discourse – although limiting her art to feminism would be an unsatisfactory simplification. The artist makes use of the powerful connotations of the pair: look – body, fundamental to her work, to create situations where the look directed at the work becomes the voyeur's gaze, infringing upon somebody's privacy, intimacy and security.

The diverse implications are present both in Hershman's earliest works and in the latest projects and include bodylessness, simulation, virtual identity, manipulation, the relation between private and public space. But the fullest expression and the most perfect (so far) union of artistic feeling with means of realisation were achieved by Lynn Hershman in her interactive installations. A specific property of Hershman's installations is their peculiar active character; her works turn back the viewers' gaze, letting them experience the state of being both the subject and the object of observation, gain-

ing the control or being under control. The viewer looking at a created world simultaneously becomes the looked-at object. Voyeurism is uncovered and the observer status - shaken and problematised. Hershman's works struggle for subjectivity; their construction presents the viewers with an opportunity to realise the mechanisms governing their social behaviour, and exposes the camouflaged rules by strength of which they appropriate works of art

In the installation *Room of One's Own* (1990-93), the camera follows the viewer's eyeball movements and transforms them into a digital signal, enabling the work to adjust itself to the viewers' perceptual behaviour. Thus it speaks not only of asymmetrical relations between people (i.e., such that can be described by the pairs: active / passive or active / reactive), but also about interpretation of art works and the rules of perception itself

America's Finest (1994) places the viewers in the field of fire of a "weapon" they are operating, thus gives equal status to people on both sides of the view-finder and links the media world with the world of death. The viewer becomes both the aggressor and the victim, and the objectifying look obtains extremely negative connotations

Both the above installations do not permit the viewer to retain his/her contemplative/voyeuristic detachment from the perceived objects. They draw him/her into an interaction, during and as a result of which s/he is forced to realise the nature of the processes in which s/he takes part. Thus, as the distance from the work decreases, there appears an awareness of the interdependence between the structure of the object and the structure of its perception; the distance from the latter increases, bringing about a detachment of the subject from himself and his own behaviour (Kluszczyński, 1996a).

Lovers Leap (1995) by Miroslaw Rogala is an interactive environment. The spectator, who moves in the monitored space with a transmitter and a headphones on his/her head, is the only one to experience the sound dimensions of the work. His/her movement results in the changes in the visual sphere as well as in the sound one. The spectator with the transmitter observes the changes of the perspective and s/he is aware that his/her movement brings about those changes. The spectator does not immediately realise how it is done (if at all). Awareness of fulfilling a controlling function does not become the form of exercising control. That asymmetry motivates the spectator into actions leading to gaining thorough understanding, which, in turn, means absolute control and power. Awareness of all these relationships however may incline him/her to make other choices, since the work questions both the value and possibility of overall control.

We can easily notice that this is interactive art to provide the most interesting examples of works dealing with the issue of power and control nowadays. This is probably because interactivity in a sense means control. Interactive art provides the viewers possibility of gaining control over their perception, over the process of creating form and meaning of the work. And since also the artists often want to maintain (to some extent) control over all those processes, interactive art communication appears as a serious game of taking over, loosing and retaking control. The issue of power and control belongs to the essential qualities of interactive art, and thus the syndrome art-media-power should be considered as characteristic for the contemporary situation of artistic culture.

Until the end of the 1980s an ideological context used to influence artistic media practices in the East- and Central-European countries much deeper than in western ones, where, in turn, commercial conditions of work influenced art strategies to a much larger extent. When Richard Serra was producing his videotape *Television Delivers People*, video artists in Poland kept analysing the medium of television, trying to uncover conventions of representation, and their political functions. The role and character of television was investigated, despite the fact that video was recognized as a separate medium. Polish video artists maintained a certain detachment from TV, and this stance (more ideological than purely artistic) was maintained until the end of the eighties. As Jozef Robakowski, the major figure in media art in Poland, wrote in 1976: "Video art is entirely incompatible with the utilitarian character of that institution (television), it is the artistic movement, which through its independence denounces the mechanism of the manipulation of other people" (Kluszczyński, 1995: 36). This is also the additional (after pure artistic) reason why numerous Polish video artists dealt with relationship between the reality, its audiovisual representation, and the spectator. They attempted to reveal the relative nature of perception, and to explore the resulting possibilities of manipulating the perception, of exercising control. Especially Wojciech Bruszewski exploited the area between reality and its audiovisual representation expressing a total distrust of any form of mediated communication. He focused on, what he called an universal relativism which was usually camouflaged by the attribution to conventions of an autonomous value. And just the media art was called upon, in Bruszewski's view, to demystify, uncover conventionalism in our preception of reality. This attitude led him eventually to the conception of the self generating text as being a limitless source of multiplying meanings which in fact communicate nothing (in the traditional sense of the term) because they represent nobody and nothing.

The world "control" almost did not exist in declarations of Polish media artists. It was usually replaced by another one: "manipulation". The artists did not analyse how to gain the control, but how to main-

tain freedom. In other words, they exercise control only to protect freedom, to protect the identity. This approach was (and still is) extremely important for aforementioned artist Jozef Robakowski. For him art is just a synonym of freedom. In 1988 he published a manifesto entitled "I manipulate." He wrote: "... throughout the whole life of my art I have fed on the manipulation which has served to blur the clear personal image. I am convinced that the artist is a kind of perfidious fraud, an ulcer in society whose vitality is a manipulation on his/her own account as an expression of self-defence against annihilation, or in other words, against public acceptance and recognition." (Kluszczyński, 1996).

It is interesting to observe how the political transformations in Eastern and Central-European countries nowadays bring all those different issues together. There is no more old regime, and art can develop without any direct political pressure. The economic aspect of the creative media work becomes more and more important. Different history, different past makes however the presence different as well. In result, those countries enter the cultural exchange with the West from the position of the antipodes (Wark, 1995). That means the identity is still in danger. This time, however, danger is coming from outside, together with advanced communication technology. And the artists have to protect their identity, the identity of their art and their culture not against any political regime, but against "regimes of technology via which the West created its relation to its antipodes" (Wark, 1995: 9). The new soft technological and cultural invasion replaced the old hard political oppression.

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Architecture of Symbiosis

"Man as a behaving system is quite simple. The apparent complexity of his behavior over time is largely a reflection of the complexity of the environment in which he finds himself"

—Herbert Simon, *Sciences of the Artificial*, 1981

[Simon 1981] notes that complexity of behavior resides in the hybrid condition of organism and environment. Here three units of analysis are posited, the organism, the environment and implicitly the behavior as well. This paper examines the relationship between humans and the environments that they create and argues that the nature of these environments is undergoing a fundamental shift, one that suggests that the proper units of analyses are the hybrid conditions rather than individual components that comprise them.

[Brooks 1991], following Simon, has undertaken the study of intelligence through the agency of robotics. Intelligence is understood in this context as an attribution made on the basis of the relationship between behavior and the environmental conditions. Intelligence is not inferred from behavior, that is, it has no independent or a priori existence that can be discovered by observation, but is completely bound into and considered an attribute of the contextual operations of the agent. Intelligence so conceived does not reside in the sensor-processor functions of the robot, but in the hybrid of "robot within the environment." There is evidence that this perspective is not limited to silicon and aluminum but may be true as well of humans and the contexts in which they exist.

In the computer game Tetris, irregularly shaped "bricks" drop from the top of the screen and are to be rotated and translated to form compact walls building up from the bottom of the screen. [Kirsh and Maglio 1994] found that many of the operations performed by players, even those that had developed considerable skill in the game, were counter-productive in the sense that they were not instrumental actions toward the goal of constructing walls. The falling shapes were repeatedly rotated in order to perceive advantageous orientations. The time required to enact these rotations on the screen and to visually evaluate the applicability of the resulting orientation is less than the time it takes to do the rotation and evaluation mentally. While this finding may surprise few Tetris players, why should it be

so? The answer lies in the genetically determined structure of the nervous system and its development as an adaptive device.

[Moravec 1989] claims that the computational power needed to achieve human level competence in arithmetic calculations is about one operation per second and for logic problems 100, but to match the human visual capacity one billion per second are needed. The specific numbers are of little consequence here. Their relative relationship, however, clearly indicates that the sensory apparatus is more highly developed than the native logic circuitry. For this reason, large and complex numeric data sets are frequently output in graphic modes to allow the visual system draw out relationships that may otherwise be difficult or perhaps impossible to ascertain. The field of scientific visualization has developed specifically to assist in this process.

One need not be involved in scientific visualization to find additional examples. Many in the design fields make use of repeated sketches at various levels of abstraction in an effort to solve functional, programmatic and aesthetic issues. There is an almost ritual externalization and re-ingestion that forms a processing loop enabling elements under consideration to be "brought to mind" for evaluation and refinement in subsequent iterations. This process is often characterized as one of drawing out, discovering or allowing relationships to emerge from the process. But there is no need to deal in spooky stuff, to attribute intention, desire, or abilities to the inert and the abstract. The relationships exist because they are established and perceived. That these occur on paper or screen makes them no less mental activities. [Kirsh and Maglio 1994] distinguish between pragmatic and epistemic activity. The intent of pragmatic operations is to effect functional changes in the environment – they are goal directed behaviors. The epistemic are undertaken in order to alter the agents computational state. Epistemic actions are integrated parts of the thinking process.

[Clark and Chalmers 1996] have proposed that the concept of the mind be extended to include the environment in which operations are performed based on the active role that the environment plays in driving cognitive processes. This conceptualization questions the boundary of the mind arguing that the skin or skull is too narrow and too arbitrary a demarcation. Tradition holds that the mind resides in the brain, how could it develop otherwise?

The mind as an adaptive system develops in response to environmental conditions. It is commonly thought that the nervous system controls and directs the body. At one level of analysis this is true, however as [Pervés 1988] notes the body effects the nervous system both in its development and its ongoing operation. The body in this case serves as a kind of non-neutral interface between the neurological structures and the environment. The interaction between the structure of the mind and the environment is clear from studies of the organization of the nervous system during infancy as well as from research indicating a continuous rewiring of the neural connections due to the frequency and strength of synaptic communications. The nervous system, in fact, is a volatile network responding to experience. This is not to argue for primacy of the body over brain but to note that there is evidence for significant feedback between the body as interface and its neurological apparatus. One cannot operate or develop without the other. The developing organism is not a passive recipient of environmental stimuli but is rather an active participant in its own adaptation [Davidson 1980].

Given that the mind develops, through the agency of the body, in response to environmental conditions, it should not be surprising that it develops in such a way as to make use of, to incorporate and to function to some extent by means of that environment. There is no advantage to the conceptualization that divides such a continuous process into elements that take place inside the skull and those that occur outside and that ascribe elements of the mind only to those on the interior. In fact, it denies the common occurrence of a kind of flow in the work where the media seems to disappear and there is only the experience of operating in realms where thought and production fuse. Doing is thinking. There are levels of complexity where, for many of us, the thinking cannot take place without the doing. It takes place at the same time and through the agency of the activity.

[Brooks 1991] in discussing the merits of embodied and situated robots notes that "the world is its own best model." He argues that it is unnecessary for the machine to contain explicit representations of its context if knowledge of the environment can be made available to it via its sensors. Information about the world is immediately and directly available in its current state. The robot may, in fact, communicate with itself via the environment. The results of an activity are given by changes to the robots context and may be directly perceived and made use of by other sensors. This is more efficient than passing the projected consequences of the action to a centralized comprehensive model and then verifying the model relative to the actual context. It may be that these benefits accrue to humans as well and may form the basis for the need to externalize certain operations so that alternative sense modalities can be brought to bear on the activity at hand. These are powerful advantages that lead to the optimization of neuro-processes with the availability of the environment as an assumption. The reliability of the external media as a repository for certain kinds of information in turn generates a reliance externalization as an integral part of the cognitive loop.

This reliance on the externalization of cognitive activity creates artifacts that may be available to several individuals simultaneously and to many over time if the object is physically enduring. This is to

suggest that the mind as an adaptive system which relies on external media for portions of its cognitive processes is especially well suited to the development of culture. [Stein 1997, Torrance and Stein 1995] propose that multiple interacting systems may extract structurally similar regularities from a shared environment and that these regularities form the basis for a shared grounding of their respective internal representations which may be disparate. While her concern is with inter-robotic communication and communication between robotic systems and humans, the principle of shared grounding is valid for social contexts as well. There is little evidence that any two of us share the same internal representations, but there is ample evidence that we are all immersed in a sea of cultural artifacts that are mutually accessible as physical objects and which form the basis for our interaction. This conference is a particularly immediate example

[Hutchins 1995b] argues that the cognitive work that is required to land a plane takes place in part through the agency of the cockpit reference materials, markers and instrumentation that serve not only a recording or memory function but by their configuration allow for the instantaneous calculation and processing of certain critical information relative to the operation of the craft. His analysis shows that the processing required takes place not within the individuals nor in the machine but by the agency of the socio-technical system that they comprise. It is concluded that the thinking that takes place during this activity resides in the hybrid condition of pilots and cockpit, not in one or the other. Here the unit of analysis has shifted from individual components to the conjunction of humans and artifact together. This translation of perspective is of more fundamental interest and wider applicability than the navigational situation discussed

[Hutchins 1995a] considers cognition to be a cultural process and culture to be a cognitive one. Artifacts which are frequently and incorrectly considered to be synonymous with culture exist only as the residue of the cognitive process. They are a kind of instrumentation that makes the process of culture available for analysis, but do not in themselves constitute that culture. Artifacts derive their utility by virtue of the fact that they are the means by which the shared grounding that drives the cultural process is enacted.

The nature of the artifact is undergoing a transition based on the widespread integration of techniques for adaptability, intercommunication between devices and interactivity with the social and physical environment. While these developments represent a difference in degree rather than in kind, they suggest that the role of the artifact in the cultural process may be strengthened within Hutchins paradigm.

[Krueger 1996] suggests that architecture may acquire elements of adaptability and interactivity through the implementation of techniques under development in a variety of fields – among them artificial intelligence, robotics, and intelligent materials and structures – and that these capabilities enable a biological metaphor, that of a socially inhabited body, an architectural organism.

[Krueger 1997] argued that there are technical parameters that suggest that complex behaviors can only be obtained by investing the architectural artifact with an intelligence and then by ceding control to it. Increases in functionality are accompanied by a loss of control. Architecture becomes autonomous.

This autonomy is a fundamental change in the nature of the artifact which in turn requires an re-evaluation of roles that objects play in both the cultural and cognitive processes. Intelligent and adaptive autonomous objects achieve an equivalency with the human participants. [Agre 1995] conveys the change that the principled characterization of interactions between agents and the environment has had for the field of artificial intelligence. The concept of agent may embrace human and other biological entities, machines and software. Each may be to some degree autonomous, intelligent and situated within an environment. Principles inspired by or generated in a variety of fields may be tested and applied in many others. Equivalency does not suggest that the objects become human or replace them, but to note that their roles become interlocked and complementary. [Kirsh 1995] uses the term complementary strategies to define organizing activities which recruit external elements to reduce cognitive loads. This concept of complementary may be applicable here as well. We might consider recruitment of the humans by the machines and the machines by humans in the service of cognitive processes operating at the social scale to be a symbiotic relationship. This does not fundamentally change Hutchins' analytic framework, but instead increases its saliency.

An interactive and adaptive architecture indicates that the locus of design migrates from form to the parameters of behavior. Its intent shifts from control to facilitation, from restriction to amplification of the design space. It becomes necessary to redefine our relationship to the products of our material culture. At the point of our perfecting the synthetic environment, it becomes populated with new beings, a second nature.

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Resonating the Fragmented Body: Sound Design in New Media

Sound The way we listen is subject to so many filtrations. As I speak to you now, you may be focusing on the content of what I am saying. The words. But also, you are contextualising those words within a host of other signifiers: in the intonation of my voice, the space of the electro-acoustic apparatus and the room itself. . . all of which conform to what you have come to expect from a conference hall. It is this material conjunction between meaning or content and the productive context that I would like to explore in this paper, in relation to new media production as it pertains to sound design in particular.

We keep hearing about content as though it is something that can just be poured into the awaiting technological vessel. The question of content to my ear however, also begs the question of the container. This split is just another manifestation of an old divide: hardware/software, technical/ creative etc.

Sound; as a resonance of matter in space tends to resist this division between content and container. If I put the sound of my voice into this glass (*speaks into glass*) – it becomes a different sound. Digital audio storage and manipulation and the advent of desktop audio production have opened the way for a convergence in the sites of media production and of the formats of distribution – but on the whole, at least as far as audio production is concerned, this has not led to convergent forms of practice.

Whilst it is commonly acknowledged that sound plays a crucial role in multimedia design it has received relatively little discussion in the plethora of books and articles magazines etc. that have been spewed forth to show us "How To." I would like to examine some of the practices currently employed in new media for both sound design and the conceptual production of which it is part, and raise some questions about the baggage those practices carry as well as the baggage that we are dealing with in bringing sound to the screen at all.

It is crucial to locate what we are doing in the context of a critical practice not only a practice of criticism. Peter Lunenfeld in his article "Theorising in Real Time" says:

"what is called for is not simply the building of a metacritical language, but a working model for practice" a 'real time' theory "designed as much for its use value for the artist as for its expedience for the theorist."

In order to approach the sometimes prosaic actualities of production processes from a position that enables me to engage theoretically with that practice I have found it is appropriate to draw on a concept of materiality that is neither the absolute and knowable "substance" of the enlightenment nor the structuralist formations of "materialism" but rather as something contingent on the nexus of bodily engagement with the material signifiers for formations of meaning. As Vivian Sobchack puts it:

"we cannot reflect upon and analyze either technologies or texts without having at some point engaged them immediately – that is, through our perceptive sensorium, the materiality (or immanent mediation) of our own bodies."

Sound is produced by the vibration of matter in space and time. Sound gives us information about the physical structure of things and the spaces in which they are heard. Is it wood or glass, metal or plastic? Is it in the bathroom, the forest the street or the stock-exchange trading room? The resonant dimensions of our own bodies determine the range of frequencies we are able to hear and produce. The greatest sensitivity in human hearing occurs around the midrange frequencies which are also

where the frequencies of the human voice are to be found. We are morphologically predisposed to a certain clear zone of perception, a slice of world we can apprehend (had we the dimensions and auditory acuity of whales we would not have ever built GPS systems to bring the relation of our position to the earth's surfaces into our scale and frequency range).

Hearing is the vibration of sound entering our body and rattling our bones. The reverberation of the space, the decay of sound in time indexes our body in time. Sound, like lived experience, is elastic within time, but never outside it. The pace or rhythm of sound is perceived directly in relation to the time measures of our bodies, heart rate and breathing. They are regularly exploited by sound designers in subtle and not so subtle ways to manipulate the perceived pace of visual materials. For in our visually overloaded culture, we do interpret auditory differences visually. We will tolerate bad pictures with good quality sound but not the other way round; but improvements in sound quality will often be perceived as improvements in image quality. What we hear directs our interpretation of what we see, what Michel Chion calls "added value."

It is hardly surprising that we borrow information from our auditory sense to support our visual interpretation as our hearing is much higher resolution than our seeing. Whilst we have the illusion of continuous movement at only 24 frames-per-second, our ears require over 44,000 samples a second to enjoy CD quality sound. We can hear from all directions, but see in only one. We hear faster than we see, and our brains process audio information faster than the speed of sound so we are always hearing backwards and assembling the meaning of sound "retro-auditively", filling in the gaps, interpreting nuances of resonance and decay to map our body into the spatial and temporal milieu. The world pours into us through our never closing ears, we are always in sound and in time.

The importance of dealing with sound's spacio-temporality in addressing design issues in "interactive" or "non-linear" works lies in the flexibility of duration which this work demands. The situation of a computer in a physical space conjuncts that physical space with a conceptual space for the computer user. We might call that conceptual space a virtual world, but the spatialisation of ideas predates that terminology by many hundreds of years, and such a conceptual space may not be constitutive of all that the word "world" implies, in this context, of self containment and unity. What is relatively new in the relation between these two kinds of space, is the possibility of bringing sound, a key index of the physicality of architectural space, to bear on conceptual spaces. In resonating these hybrid spaces we should not be drawn into the trap of restricting sound to a spatial representation enslaved to Cartesian geometry – conceptual spaces are not constrained to three dimensions and the way patterns in sound are understood do not follow the perspectival habits we in the West have developed visually. The designation of the screen as a window on a world, or windows on several non compossible worlds, is shattered by the emanation of sound from the computer into the physical space. In resonating the conceptual space we have also to resonate the space of the listener and the hardware of the computer. Sound, more than any visual link-up, has the capacity to actualize a presence of one space in another, regardless of physical proximity (hence the immense popularity of the telephone).

Before the advent of recorded sound the question of "where" a sound was had a different relation to the body of the listener, the resonance of spaces indexed the hearers movement in the world (The resonance of an unfamiliar space still draws our attention to our own footsteps). The invention of recorded sound created the possibility of displacing the space of sound and reorganising its temporal flow through editing, changing playback speeds or reversing the tape. The one thing we cannot do to that temporal flow of course is to stop it, not at least without ceasing the sound. There can be no freeze frame.

Once divorced from its original context, sound becomes an object in its own right, not just the barking of a dog (certainly not that of a particular dog) but a piece of duration up for grabs to be speeded up, slowed down, repeated, reversed, reverberated, etc.

With analogue equipment there was a strong sense of the sound having a concrete autonomous existence. This [*holds up a piece of 1/4" tape*] is something you can get your hands on, you can know that this is a cough cut from the middle of a recording made of someone giving a paper at a conference like this one – it has a certain material autonomy – you can reproduce the cough by running it across the heads of just about any 1/4-inch tape machine.

But actually an analogue sound is no more "a sound" than is a digital sound – it's only an analogue of a sound and with either analogue or digital storage it is possible to change the sound in ways that would be impossible for the originating body to produce. Each technology introduces its own components into the sound it re/produces bringing about a re-embodiment of the sound; in this regard the reproduction of sound is never reducible to representation. The recording or transmission of analogue or digital sound creates not disembodiment – but an impossible, or non-compossible, re-embodiment.

Many of the things which have been said about the digital manipulation of recorded audio are also true about analogue recordings but there are additional aspects to digital storage that highlight things which perhaps didn't draw our attention so strongly before, such as the issue of "where" the

sound physically is when it's stored. The material affordances of digital technology are different, but they are still material.

When a sound is digitized it seems to go through another level of abstraction from its material origin; once it is represented as zeros and ones the manipulations that can be enacted on it are not subject to the same constraints as with analogue equipment where for example, a tape loop must be at least long enough to fit around the assemblage that houses the tape head and tape driving mechanism and the period of time for which it can be repeated is limited by the wear on the tape surface itself as it passes through the mechanism and across the heads, in the digital domain the tiniest sample can be looped indefinitely. What is important here is that it is possible to adjust the parameters of data to produce new sounds which would not only be impossible for the originating body/source of the sound to produce; but which additionally exceed the capacity of the listening body to perceive; since the parameters of the output can be adjusted outside of time in disregard of the limits of hearing and response time of the listening body.

For example, in some software, you can zoom in and stop the sound and draw on the wave form pixel by pixel directly manipulating the stored sound data at a level of detail that you couldn't do on the fly – you start to be able to make adjustments at levels of detail the ear cannot detect, to push beyond the threshold of perception. This is frequently achieved by a visualisation on the screen which enables us to work with sound without listening to it. But rather than looking at this as a greater degree of abstraction, as a de-materialization, as the of virtuality and digitality tend to do; I prefer to look at it as a re-embodiment, as the resonance of digital stuff. After all as Friedrich Kittler has argued there is no software, that is to say, what we call software is in fact entirely dependent on hardware to run. The immateriality and virtuality conferred upon all things digital needs to be explained in other ways.

This question of immateriality is part of a much older problem of how we define intelligence as separate from our bodies, and the burden the computer has carried to emulate this disembodied brain. This conception of intelligence as unconstrained by bodily and therefore perceptual limits, is really apparent when you read things describing "intelligent software" and you think about what that software is actually doing and often it's just something really simple – but it's doing it really fast. Intelligence in this context becomes synonymous with physically inhuman speed, speed that exceeds human perception.

Sherry Turkle, in her keynote, has addressed the issue of transparency as a disappearance of the workings of digital machines. That transparency of the technology stops us thinking about the material affordances of digital audio as being material. But this idea that the sound is virtual, or not there, is in a sense just an accentuation of something that existed already with analogue, there isn't a "sound" "there" (holds up tape) – you've just got a pattern of magnetic rust on a piece of plastic and if you de-magnetise it the only sound it makes is: [*scrunches up tape near microphone.*]

You become more aware of this absence when you see people looking at the wave form representation on the screen of a non-destructive editing software and saying "OK, there is my sound". Because it is stored in a more fragmented way; and because what we see on the screen is only in fact a particular instance of a representation of a magnetically stored data pattern; and because the manipulations we make on those instances can be stored separately as a session file, or midi data, or effects settings, or macros which may be entirely transposable to other sets of recorded audio data: we become much more aware that there isn't a sound "there."

I want to take a quick look at some of the factors prevalent in current new media practices which impinge on our capacity to really tackle the acoustic space-time of new media – particularly the incongruous juxtaposition of filmic models and page-based textualities as models of the screen space (I am not saying that incongruity is a bad thing, but let's notice it). A lot of existing literature on sound design in new media tackles technical issues without drawing into question a model borrowed from film which distinguishes categories of sounds according to either diegesis: voice over, dialogue, sound effects, atmos., music; or relative to the spatial dimensions of the shot: foreground mid-ground and background – the long, medium, and close up shots of audio.

But the already complex relation of point-of-view to point-of-audition works differently when the viewer is kinaesthetically implicated by mouse movements, for example, across a two-dimensional surface that rarely conforms to the same codings of the representation of space that inhere to cinematic naturalism; the un-naturalness of which we should not forget.

In the early days of sound cinema there were strong discussions about the relationship between the eye and the ear – the idea that you could see something in long-shot and hear it in close up at the same time was deemed unacceptable. Rick Altman has documented in detail the transition, within ten years, from this desire for a natural proportionality between image and sound to a prioritisation of clarity in dialogue over spatial verisimilitude. This is one of the many rifts in the perceptual coherence of subjectivity that have not only never healed but which have proliferated, fissuring, bifurcating, replicating in multiple lines of flight from the totalising unified subject position that our disembodied Cartesian minds once aspired to. Michel Chion says.

"this question of the unity of sound and image would have no importance if it did not turn out through numerous films and numerous theories to be the very signifier of the question of human unity, cinematic unity, unity itself."

The cinematic model of point-of-view and point-of-audition in sound space, seems incongruous at the interface between digital stuff and the distributed self. Existing practices for conceiving of new media forms privilege particular ways of knowing which the experience of listening and the resonance a body in the space-time of sound might bring into question

While production techniques are by no means fixed, and are constantly evolving. One tool which seems to be making its stamp fairly and squarely across a wide range of non-linear digital productions is the tree diagram. Whether it looks like a tree, or it looks like a rhizome, or whether it looks like a molecule kit; the basic form of the diagram, comprising a link and a node, carries strong spatial/ representational implications. The node often maps onto the box of the screen shape, the links define "movements" between these screen "spaces".

The tree diagram as a taxonomic tool for defining bodies of knowledge, as manifested by the enlightenment encyclopedists, finds extended expression in the origins of what we have come to know as hypertext. When Vannevar Bush invented the Memex it was a question of drawing conceptual links between discrete and knowable scientific data zones. Bush's context for inventing the Memex idea was to do with a certain episteme which defined the known and the knowable, and in which connections between discrete units of knowledge could be transparent and self evident. I would like to suggest that an embodied perceptual experience such as listening demands recognition of other kinds of knowledges to which our historically disembodied intelligence is inadequate and this needs to be reflected in the way that sound design is incorporated into digital multimedia projects

At this point I should reveal some of the impetus behind my writing this paper. I have just had the privilege of working for several months on a project, which shall remain nameless, where I was hired to stick some sound effects in after all the creative production decisions had been made. After producing hundreds of little sound files for each section of the title, these files then went to the programmers who effectively did the mix in a paint by numbers kind of way. Designing sound in this situation involves, to an extent hearing all the little bits as an imaginary whole and finding a resonance appropriate to the juxtaspace of the screen. The relevance of this experience is not in its specifics, but in its typicality. We too often hear lists of ingredients for new media comprising graphics, video, photography, text, "etc." when the only "etc." left to the imagination is sound... Sound as flavor-enhancer for visual media.

The point I am making here is that it is not possible to say "here is the technical stuff," and "there is the content creation over there somewhere." The "de-eterification" of sound can only take place via a critical re-working of current practices. A successful convergent multimedia practice demands a convergence in bodies of knowledge and a re-evaluation of ways of knowing.

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On Multimedia Syntax:

A Semiological Perspective (What We Might Learn From Print)

My initial idea for this paper was to examine multimedia syntax, using semiotics as a tool to critically evaluate concrete examples of CD Rom and web site designs, and to outline a few suggestions for future developments. Given the limited time available, however, and after reading the introduction to this session and the abstracts, in which issues of narrative, the linearity of texts and interactivity appeared prominent, I have decided to focus on and problematize what I propose to call the dual materiality of texts, more specifically their typographic materiality, and consider some implications of that materiality on multimedia authoring. In the light of recent hypes and wild claims that print was dead, it is important and relevant not to lose sight of the contexts in which certain key concepts about reading and writing have emerged and evolved, before the advent of electronic media/platforms.

I would like to point out that I have greater ambitions for typography than the ergonomic or hedonistic functions it is traditionally associated with in print and multimedia. The typographic

materiality I have in mind is a semiotic materiality, one dealing with the text as text, i.e., in its textuality rather than its visual appearance. I would also like to take the opportunity of this session to point out that the artificial division and separation of tasks between authors and designers (each dealing with the text as if it was a different object) has and is preventing the emergence of new forms of textuality in print and multimedia. The paper ends with a call and rationale for rethinking the traditional boundaries erected between design and authorship and identifies a productive example of intervention across media.

From this perspective, graphic space – the space in which texts occur (space here does not just refer to physical space but to a semiological one; likewise, text does not merely refer to lines/strings of words, unfolding along a linear axis but, as etymology allows us, after Barthes, to a multilinear network of relations between threads) which, woven together, could extend the quantity of information presented: in this example, through annotations and commentaries fitted between the lines and in the margins; or generate new spaces/platforms, as anticipated by artists and designers in the early 80s and, more importantly, new structures capable, according to the hermeneutic propositions of Ricoeur (1981), to open up new meanings, new possibilities of interpretation.

Implicit throughout the paper is a critique of the limitations of visual values in multimedia, which simulate visual experimentation, but in effect inhibit semiotic innovation – or what we might call a semiotic visibility – by confining reading and writing to a "retinal" rather than a conceptual experience (to adopt Duchamp's expression). In this respect, the paper offers a critique of (retinal) visibility, from which visibility (conceptual visibility) will come out enhanced.

This epistemological mutation I envisage for multimedia authoring calls for a thorough examination of historic precedents and a fresh look at print and other media which, at various stages of their histories, have attempted to evolve new forms of textuality long before the appearance of electronic texts (Seaman, 1972).

It also involves considering the productive role of metaphors (Derrida, *White Mythology*; Ricoeur, 1986:284-) in generating new insights. In this respect, it would be fatal to ignore the experimental work carried out in other fields by Godard and Greenaway in film, Barthes and Eco in literary criticism, Derrida in philosophy, Tschumi in architecture, as it is to read them superficially, under the pressure of intellectual fashions, and let them become mere alibis for conservative practices...

Concentrating on one concept. What, either in the moment of writing or in the process of reading-and, with due attention to etymology, we may call graphic space? I would like to suggest that this notion would gain to be theorized in semiological rather than in purely visual-aesthetic terms, as it is at present, so that we may highlight the as yet unrealized semiotic contributions of the visual to the staging of information, the presentation of narrative and the development of multilinear structures. I say multilinear, rather than non-linear, as I feel somewhat sceptical about the claims of non-linearity, so widely – and, it seems to me, so uncritically – evoked in discussions of hypertexts.

Graphic Space: the space where writing is inscribed either in manuscript or printed form... the space where the text is laid to rest, preserved and/or entombed for posterity; but, simultaneously, opening itself to "an unlimited series of readings" (Ricoeur, 1981:91)

With the advent of writing, the text unfolded the linearity of the signifier along another second or third material axis, outside the body but mimicking its movement along a baseline before assuming more abstract conventions in ancient Egypt, Greece, and the Near East.

At that point, the body of the text subsided into the metaphorical space of the specialist jargon of typographic workshops. Meanwhile, in the pursuit of specific functionalities, writing retained the scroll format, alongside the codex, from Ancient Egypt through to the modern period, and the scrolling texts of electronic media.

The apparent linearity of the text, itself a direct consequence of the linearity of the signifier, has become a common cliché of discourses which set out to valorize electronic alternatives to printed texts. The problem with such assumptions is that they seem to confuse texts with their material support.

From this perspective the same attribute of linearity may be imputed to James Joyce as to any example of pulp fiction. Ironically, as the reading process would indicate – were it made visible – this so-called linearity is only of the eye, not an attribute of the text or of reading, but external to it; for in the course of reading, (starting at the most basic level of sign gathering) the processes through which the text is apprehended do not present these characteristics.

On a purely ergonomic level, for instance, legibility research has suggested that in the course of reading the eyes do not follow a uniform linear pattern, but jump from one cluster of letters/words to another, punctuating this with fixation pauses, which represent 94% of the total reading time; reverting, when necessary, to an earlier sections of the text, before moving on, by a series of jerks which, paradoxically, we perceive and experience as a regular linear pro-

gression, rather than as the subliminal visual cacophony analogous to what really happens.

If this process could be made visible and translated typographically, it would not echo the carefully considered word and letter-spacing, leading, line length of classical or functionalist typography, but an irregular/chaotic rhythm which broke the rules, like some examples of new typography. By not availing themselves of the means to act meaningfully upon the text as text, the new typographies have failed to open up new forms of textuality.

Subservient to an authoring process from which they are excluded, the new typographers only intervene on one materiality of the signifier, (generating a visuality which works in parallel with the writing of content, but without impinging upon it, except as visual flirtation). Reduced to a packaging role, dressing common-place journalism in seemingly experimental visual forms; the scope open to designers is to make ordinary messages appear more exciting, in the eyes of a gullible beholder. In doing so, designers have/are being denied (are consistently denying themselves?) the opportunity of participating in the process of authorship. Given the clear-cut separation between authoring and design, in the world of publishing, (for an exception see *S, M, L, XL* by Rem Koolhaas and Bruce Mau) artistically ambitious designers are reduced to manipulating and styling graphic signs which carry authorially fixed/formatted meanings.

The implications are far-reaching; as the task of typography was, and still is, in the main, regarded as providing a material form for the representation of texts and, therefore, as external to the process of authorship; it has retained its role as an adjunct, carried out by designers who are constantly reminded that their task is to serve the text and the author, with the intimation that they should not interfere with content. Recent attempts to intervene in magazine design—where the materiality of the text is emphasized through retinal forms of visuality, are not transferable to other graphic genres, as they manipulate the text from the outside, not at the level of its textuality.

To summarize, it may be useful to distinguish between two forms of “visuality” applied to texts:

- 1) A visuality which draws attention to the external/retinal materiality of the text, engaging readers/viewers in a kind of visual play/puzzle delays in the denotation of the text. This tendency gets usually characterised – somewhat simplistically – as “aesthetic” or “expressive” typography (as if aesthetic and visual play were synonymous); it occurs in TV commercials and title sequences, the layout of style magazine, the design of wacky letterforms, etc.
- 2) The second form of “visuality” I have in mind does not refer to the visible manifestation of the text in its physical materiality, but to a second-order materiality which opens up the dimensions of the text as text. Through a strategic display of its semiological body / structure, it facilitates—or in this instance, by a student on the MA course in Design and Digital Media at Coventry University, which explores the concept of dystopia in language – it provokes reader’s engagement with the text and the proliferation of individual meanings.

The first form of visuality is traditionally the outcome of design work; the second has seldom been attempted, but is/can only be an outcome of the authoring process. The history of those attempts, in print and other media, is unevenly charted and scattered across different fields and disciplines (literature, the visual arts, music, typography and their respective histories). Retrieving these precedents is important, as it will enable us to explore and develop new forms of visuality, new functionalities for the visual structuring and presentation of texts. John Cage’s *Roaratorio*, presented as a re-reading of/through Joyce’s *Finnegan’s Wake* is suggestive of new patterns of interaction and integration between and across media; by restoring the materiality of music and sound to the literary text, it also highlights the multilinearity, multidimensionality and openness of the Joycean text, as well as its capacity to generate new works across media, on the unlimited chain of semiosis. . .

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Glass Angels and Data Insects

And now Aeneas saw in a side valley a secluded grove with copses of rustling trees where the river Lethe glided along past peaceful dwelling houses. Around it fluttered numberless races and tribes of men, like bees in a meadow on a clear summer day, settling on all the many-coloured flowers and crowding round the gleaming white lilies while the whole plain is loud with their buzzing.

Virgil describes the underworld. The souls of the dead draw from the rivers of forgetfulness to re-format their hard drives and enter a new life back on earth. Virgil, the son of a beekeeper, makes this comparison between human and bee society throughout his verse. As in the Roman ideal, the world of the bee depends on the rule of a single monarch, and members are ready to sacrifice their lives for the whole.

This talk is about the way insect colonies offer themselves up as mirrors for their human hosts. They provide a language for arguing between the needs of the collective and the individual. Like insects themselves, these representations mutate over time and can evolve into exotic models of human behaviour. McLuhan spoke of the mission of humans to “fecundate” technology, and here we’ll examine our evolution into the bees of the electronic world.

We’ll need to fast forward.

Our last stop is the nineteenth century, when insects offered proof of the intricate handiwork carried out by the divine craftsman. Before Darwin revealed otherwise, entomology was a pious pursuit, implying appreciation of the fine print in god’s plan. As a nineteenth-century religious tract, *The History of Insects*, proclaims: “The Lord of hosts is wonderful in counsel, and excellent in working.” Written from our more worldly view of nature, A.S. Byatt’s *Angels and Insects* uses the insect kingdom to show the savagery beneath the surface order of Victorian society.

In our time, the theatre of insects has moved from the bench to the screen. On the way, Susan Cohn has produced a liminal series of creatures titled *Reflections*, which invokes the Lalique dragonfly woman, who will appear at the very end of this talk. These elaborate condom sporrans have wings assembled from rainbow reflective sunglasses, through which human faces turn into bug-eyed screens.

The screen looms particularly large in the French film *Microcosmos*. This is a documentary of pure image—no biology, no sagacious commentator, just pure screen spectacle. “Meet the Beetles!” as the publicity proclaims.

With the possibility of operating on the screen, electronic art has the potential to immerse us in the world of insects. In Toshio Iwai’s *Insect Music*, we can manipulate a network of sound bots to explore musical algorithms. Composers such as Michael Nyman and David Chesworth use the insect as a device for developing sound loops; there’s something intrinsically digital about insects

Popular computer arts draw on an enduring fascination for the spectacle of insect life. The most literal of these, *SimAnt*, transforms the desktop into a digital fornicary. Other Maxis “God games,” such as the ever popular *SimCity*, put human society itself under glass and transform what might seem a meeting of individual interests into a congealed mass of algorithms.

While such “God games” put us in the position of beekeeper, there are other titles that consign us to life as an insect, at least during our time on screen. Such moves exploit the way we shrink ourselves to centimetre high cursors in order to fit onto the desktop.

Alyssa Rothwell’s comic CD-ROM *Three Mile Creek* is one of many titles that popularise the screen with flies. In this scene, waving the cursor helps shoo flies from the backs of these Aussie blokes. While we struggle with the awkward interface between real and virtual realities, insects are privileged to move freely between analogue and digital. Have you ever tried to move a fly from the outside of your screen with the cursor?

“Waiter, there’s a fly on my screen.” It is with this freedom of passage that the fly first introduces us to our new life at the interface. The menu screen for Peter Gabriel’s CD-ROM *Xplora* positions us as a fly on the star’s face. As one of the first public encounters with multimedia, this title is responsible for teaching us how to behave in front of a screen.

It provides a model for the most played CD-ROM, *Myst*. For much of this work, we are a mere fly buzzing about its monumental scenes. This is given a more literal representation in *Myst* imitators, such as *Bad Mojo*. The hero is here transformed into a cockroach, which has to perform a very *Myst*-like quest of re-connecting broken circuits to save a beleaguered father. Filled with *Myst* jokes, the CD-ROM *Obsidian* contains an infestation of various digital critters, in forms such as these nanobots.

Mark Posner once warned that new media is like the juicy piece of meat you throw at the dog so you

can rob its house unharmed. Well, in multimedia, it seems the flies have got to the meat before the dog. By contrast, the Internet seems too text-based to attract buzzing cursors. Yet it is the rhizomic quality of the net that makes it the ultimate apiary, as artists are now beginning to discover. As many have observed, searchbots are the Internet's native insect species, gathering information pollen from sites around the world and storing data in hives such as Altavista and Lycos. Given the current experiments with "endogenous fitness," it is not long before rogue bots evolve to form their own hives.

This year, we witness a flowering of art that draws on this energy. Web art has moved from works of singular artistic vision to invitations for mass participation, such as Jane Prophet's *Swarm*. Following the successful *technoculture*, this site invites narrative contributions to the hive mind as well as offering entomoid diversions of painting with pixel swarms.

This bridging insect metaphor is no longer a necessary means for sites to invite participation. Entomoid pleasure features strongly in a site which appears to have nothing to do with insects, Alex Shulgin's *Form Art Competition*. Submissions for this site turn HTML from a medium of communication to an anorganic substance for visual patterning.

The brevity of insect life makes it an apt stage for evolution – this theatre of rapid mutation is now turning into a mirror. *Persistent Data Confidante* demands of visitors a confession before they can enter the site. The database of confessions will be culled so that the most popular 10% can be mutated so by the end we can uncover the secret of secrets.

Looking at how wax is produced helps us understand the way information may be secreted as a material substance rather than exchanged as an object of communication. With the tarsal joint of its hind leg, the bee extracts a kind of dandruff from its dorsal segments, which it mixes with saliva and kneads into wax for the walls of the hive.

In a site such as Rose Stasuk's *Pocket Protector*, participants extract images that are scaled and treated until they can be inserted into the image layer and contribute to a collective work.

What better example of what has now been celebrated at every opportunity – the hive mind! For its wired prophet, Kevin Kelly, the emergence of distributed computing enables forms of intelligence to develop that transcend individual consciousness. He offers us a Faustian bargain – to forgo our sense of self for a greater collective buzz.

Despite the millennial appeal of the swarm, we must accept that a decision to enter the hive, either fantastically in art or through banal everyday decisions such as buying a mobile phone, entails some kind of loss. You can't re-format the drive without destroying the data.

David Blair's *WaxWeb* sits very much in the interstice between the old and the new – I and we. The basic story concerns an earth haunted by the future dead, as seen on bee television. In the course of its web life, this narrative evolved from an authorial vision to a collective Waxmoo.

Like all metaphors, insects provide only part of the picture, and as a transitional web site, *WaxWeb* grants a central role to the missing element: the artist him or herself. The beekeeper hero wanders through NASA like a terrestrial astronaut, attuned to the alienating effects of the technological edifice. His presence evokes older more paranoid images of insects, such as Kafka's *Metamorphosis*. Think back thirty years to the last great humanist movement, when it was still possible for a popular author like Robert Pursig to use insects as a spectre of totalising technology.

Around this time emerged the singular icon of a human trapped inside the insect. Dave Bowman from *2001: A Space Odyssey* is a worker bee attending to his intergalactic hive – that is until it decides he is no longer needed. The ensuing struggle with the very technology that gives him life is economically rendered in the image of a face behind glass, like a bug in a jar.

A descendent of that image may be seen today in the figure of Buzz Lightyear, from *Toy Story*. This helmeted hero has his own more existential form of alienation as he glimpses an advertisement for himself on the television. The singular self-fashioned hero suddenly recognises himself as just another commodity on the shelf, a disposable item of the system.

This curiosity for the plight of human trapped inside the machine had led to a particularly dramatic form in *Star Trek*. In the evolution of human into insect, the fantastic species known as Borg have internalised the previously exterior viewing apparatus. The space helmet has been now absorbed into their left eye, which provides the screen through which they see the world as one of a collective. The recurring object of fascination in *Star Trek* is the inner life of Borg. Characters like Hugh, Picard, Data and in the CD-ROM ourselves, find themselves absorbed into the Borg collective partly to prove that human courage can resist the critical mass. While *Star Trek* offers a more traditional romantic opposition between individual and collective, we can recognise the underlying equation between the crew of the Enterprise itself and insects who diligently pursue their duties for the good of the whole.

Looking back now over the depiction of insects in recent media, we can discern two opposing positions on entomorphism. The utopianism of the small screen would have us lighten the load of individualism – to pool our creative resources and make the honey of collective art. In the more paranoid big

screen, such assimilation represents a betrayal of self, with its fragile allegiances to friend, family and home. These voices can be heard everyday as we make choices about going online. It's the question of our time, and the insects are our question marks.

Resistance is futile, *not*

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Nettropics Interactivity and the Synthetic Plane of Immanence

Reflecting the net as an extension of human informational processing one can encounter a certain sprout of its mental fractalization, which is essentially not a cluster or a map of possible informational pattern recombinations, but pretends to be as if it is for a correspondent faculty of our mind has to survive and support the bioelectronic correspondence in the economy of action (operationally, it is nothing more, than geometry of perception, of course). Hence, there is another economy, located beyond the simulation, a hypersimulatory pattern, which clashes artificial and human intelligence in the frame of homonified conceptual location. It suggests that the net can be a synthetic plane of immanence, and that it can spatially realize the concepts which never could be realized before either on the institutional basis of philosophy, nor on the basis of folk economy of concreticism.

There is a mimicry effect inherent to electronic technology, in accordance with which the relation between artificial and biological neural networks in the process of informational activity is hidden behind the "as-if intelligence" of computational systems. For example, the whole area of pattern recognition research is based on the technological transcendence of human ability to recognize and classify patterns. The mathematical transcendentalism and fundamentalism are fused in one, when it concerns artificial intelligence: the rational behind fuzzy ART and ART map discourses of clustering and mapping informational activities are good examples of how one can transcend a neural simulation by making it operate as if it would be naturally attributed to the area of human mapping activity. Although fuzzy neural networks are a successful mental hybrid, which possesses the advantages of both neural networks (plasticity in incorporating expert knowledge) and fuzzy systems (excellent learning and optimization abilities), the representation of their activity, and hence the interactivity with the operational factor of human systems is limited to eidetic reduction of the screen image.

With the development of interactive media, screen border seems to position itself as a materialized limit of content: almost Cartesian zone of dual visibility, inside and outside of the machine being simultaneously exposed to the user. In the latest artificial intelligence reviews one can find the reference to this zone of content visibility. Take for example Douglas Hofstadter's analysis of Stanislaw Ulam's opinion about perception as a key to intelligence. Ulam wrote: "you see an object as a key... it is a word as which has to be mathematically formalized. Until you do it you will not get very far with your artificial intelligence problem." Hofstadter concludes his research in the following manner: in any case when I look at Ulam's key word "as" I see it as an acronym for abstract seeing.

Indeed, it seems that there is an interface of perception missing as an alternative to the existing and widely abused interface of action in digital culture. This gap in digital economy makes us look for the content in simulation as synthesized perception as opposite to interactivity as a synthesized action. However, in the neurocognitive context it is possible to analyze the synthetic interaction of human and electronic systems, with the following extension of the analysis into conceptual, economical and political faculties. And to the same extent as neural research influenced social sciences, the models of neural networks bringing out a necessity to define the infrastructural elements of human intelligence in terms of its vision and activity, in digital culture neural network and related representational models play crucial role when it concerns content.

For example, if neuropharmacology investigates the effect of certain chemicals on neurotransmitters, assuming that a neurotransmitter is a functional element of the brain which is responsible for the reception and transmission of information, then a hypereurotransmitter can mean an internet based community, which is responsible for the analogous functions but in the area where human and artificial informational processing are juxtaposed. Then, there can be a discipline named hyperneuropharmacology, which would investigate the effects of various informational agents (including chemicals, emissions, and informational/cognitive sequences) on the aforementioned communities and their environment.

The complex of informational agents, which establish intensive perceptual modulations anchored on both sides of the thermodynamic wall and henceforth provide a hypertherapeutic effect on informational systems can be referred to as nettropics. This is a place, where horizontal economy, to use a Marxian metaphor, digs itself a grave: by alienating nootropics. Even though none of them were legalized at least in the states and some of them are prescription medications in different European countries, medical industry all around the globe invests in the nootropic research. Since financial analysts estimate that such cognitive drugs could quickly produce sales of well over a billion dollars a year in

the U.S. alone, and ultimately outsell antibiotics and tranquilizers, the competition is fierce, and these companies are in no mood to investigate ways their substances might work synergetically or in combination with other substances or other complexes, including the net.

Post-modern social sciences and contemporary philosophical theories of technology often consider the element of simulation and hyperreality as a part of contemporary mental universum. In fact, from Heidegger to Baudrillard there was a strong tendency in philosophy to highlight the influence of technologically mediated and even economically and ideologically simulated (in case of Derderian's analysis of espionage structures) social terrains. From this point of view, current mental alienation of biotronic conceptual status, is even more appealing, than physical labor alienation of the dawn of technology. And as the latter was resolved with the geopolitical pattern recombination of industrial and socio-industrial revolutions, the former as the closure of revolutionary localities should be resolved on the metalevel: the selfdominant for synthetic concepts should be defined and neurologized, embedded in users processing with existing one dimensional ideologies, economies and politics being referred and mentally attracted to this new field.

The fact that neuralization substitutes the revolution, speaks for itself in terms of spatial properties: the new plane of immanence is not a frozen pattern of biosocial oscillation, with which philosophy can easily play, it is a dissipative and in some cases self-organizing terrain of attractors, which implies that at least a part of its organizational points are useless. In terms of neural networks, the new emergent attractors of pattern recognition activity are referred to as spurious memories. Net as a bio-electronic phenomenon has plenty of them. It is wilderness for Freudian practitioners, or may be an avatar of escape from recurrent dissublimization: if we look at this phenomenon from the neurological perspective, then cocaine as a neuroformative element of Freud's cognitive-textual conglomerates, which Freud himself censored out of his textual consciousness, becomes a decisive monodimensionally directed psychotropic factor, which intensified author's perception through the interference with the activity of and consequential disintegration of the brain pleasure centers, and determined Freud's discourses of sex and power. Hence, Freudian cognitive-textual complex in order to survive and stay integrated had to acquire external centers of stability, which formed the basis for subconscious interpretations techniques. Accordingly, projected onto the bioelectronic plane, dissublimization of the net spurious memories, should be connected with the hierarchy of perceptual intensities.

Hyperreality Neurologized

Historically, humans heavily relied on the plant kingdom and its interlocked network of species localities, in their relation to perceptual modulation. In this context the phenomenon of ascribing "as if consciousness" to plants (rigidly criticized by Searle as fallacious construct of human conscious activity) acquires in fact rational explanation: human consciousness and its functional planes and localities was historically connected with psychotropic compounds found among multiple botanical species. If one describes the functions, which the plant kingdom performed in relation to human economy, one can name replication and transformation: it produced the environment for people to grow and multiply and brought the outer environmental information directly into their neurological centers avoiding monitoring filters of consciousness. That is why one point was always a priori informationally censored, because it was embodied in the historical development of the perceptual modulation dimension: in particular the fact that human informational system as founded on multiple levels of input was based on the transformative biochemical terrain, which accepted no outer representational activity. The effects of psychotropic plants were directly neurologized via molecular synthesis inside the human organism.

Being separated with the great thermodynamic wall (the difference in energy-entropy levels) artificial and human neural networks can not be integrated directly. That is why "as if consciousness" as a pattern of synthetic neurological integration emerges in the sphere of artificial intelligence as well as in human relation to the plant kingdom. As a matter of fact, Victorian passion to organize plants into garden mazes seems to be one of the first spurious attractors of European mentality; now, we know what terrain it has marked, a desperate attempt to form a synthetic plane of immanence. With the appearance of artificial intelligence, it is pretty obvious why those labyrinths were organized in patterns.

However, the idea of revolutionary movement as a pattern reorganization of biosocial dispositions also acquires reinterpretation from the point of view of the biotechnological conceptual plane. The complex mental curvatures of Campanella's, Marxian, Lenin's, Mao, and other revolutionary (whether imaginary or actual) discourses is spurious in nature to the existing state of economic affairs of their contemporary societies, and hence alienated and transformative: they caused new ideological and economical patterns to emerge.

With the discovery of neural systems, the ability of single class networks to generate additional or spurious memories was classified as generalization activity, when involved in the pre-recognition of new stimuli (Ezhov, Vvedensky, 1996). This aspect of artificial neural networks corresponds to the immune complex of human systems, where antibodies are preliminarily generated in order to establish a binding with a potentially new antigen. The fact that the reaction to an imaginary agent is present on both sides of the thermodynamic wall constitutes an abstract tunnel, a hyper-neurodimension of interaction between human and electronic systems, and opens biotronic perspective of development for the net as a hybrid aggregate.

The best indicator of spurious memories on the net are virtual complexes and communities, which are designed to "reflect" the actual structures of human society and architecture. They remind an easy interpretation of chimerical patterns in human dreams, when imaginary cities are interpreted as real. For example, imaginary city of London is taken as if it were London. If one considers new attractor-spurious memory effect, the phenomenon of "as if London" becomes possible only, if the informational system, revealing its resemblance with immune complex has generated the class "London" in advance. The same concerns virtual architecture on the net, which does not of course reflect, but replicates the class of Amsterdam or London in virtual reality data bases. Human operators have to assume that the city, which they build is Digital Amsterdam before the spurious representation is architecturally realized and installed on a server.

Consequently, virtual architecture takes over a replication-transformation function first of the plant kingdom in the process of reintroducing an agent of the outer environment inside neural networks, and second, of the revolutions by reorganizing communities on the virtual basis.

The concept of node can be regarded as a focal point of synthetic content deployment. Nodality as a synthetic spatiality is a multimedia interactive framework which relates to the concept of node as location interference within the context of informational technologies, and addresses its architectural, perceptual, and conceptual properties. Based both on the internet (as a network of single/multi-user worlds) and in a physical locality (as interactive projections) Nodality creates temporary zones of interference where traditional monospacial semiotics is confronted with transgressive multispatial architecture.

The classes of this new spatial language are organized by location in both human and artificial neural networks, and not by qualities or properties. To the same extent as plants reintroduced the outer environment in a perceptually illegal way (avoiding the filtering of the outer senses) in-forming human systems, the net reintroduces it in conceptually alegal way and reveals that, as much as spurious memories are utilized, net is first of all a psychotropic complex. As such, like many other psychotropic natural or artificial compounds, the net possesses the structural key to the neural informational processing. This phenomenon is not and cannot be controlled by either human or artificial intelligence, it is extremely autonomous, to the extent of aforementioned conceptual illegality: from the point of view of the law the action, for example, of currency analysis, destruction, and who knows, maybe replication on the internet can be interpreted as the act of crime or of art, depending on the extent of reality. However, this is exactly the point, where semiotically based intelligence of the law is decomposing itself under the influence of higher informational structure: virtual index of membership and action leaves no unified space, time, and agent of action. Thus, hyperreality of neural network simulation is censoring every possible plane except that of neural terrain. In this context digital culture relates to speed (similar to the futurism movement and scientific art at the beginning of the century) as the most abstract representation of transformation.

There is a tradition in post-modern philosophy in accordance with which speed can be regarded as a formatting factor of economical hyper-terrain. This theory was thoroughly developed in many areas, however it will be appropriate to focus here primarily on relevant applications. Among them there is philosophy of geography (Olson), the philosophy of espionage (Derderian), and the theory of general economy (which did not make it yet in to the textbooks according to CAE) developed by Bataille.

From the analysis of the structure of espionage (Derderian) and development-based world maps (Olson) it was derived that speed can be understood as a hyper-factor in reflecting and reorganizing reality. Extending this conclusion into the electronically mediated cultural sphere: we can investigate what role the factor of speed plays in artificial environment; and how it influences interactivity as a cultural relation to image.

By definition, synthetic or hyperreal nature of any perceptually based simulation makes it structurally dependent on its own speed. In other words, in order to differentiate between relative positions within this virtual reality such factors as information velocity ascribed to a certain locality have to be considered in the first place.

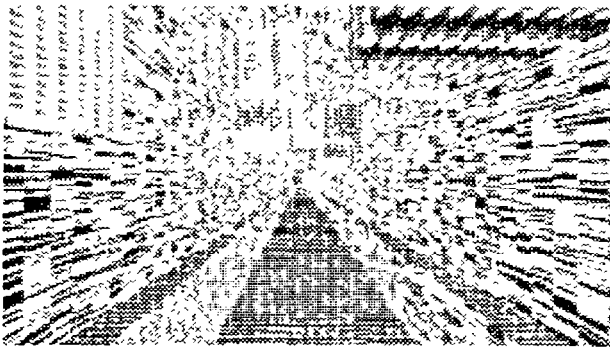


Figure 1

Within above described framework, the concept of interactivity acquires an interesting property. It changes a polarity on the scale of editing. In general, interactivity can be understood as a socially, culturally, and informationally preprogrammed approach to eidos, which defines correspondent modalities of representation. However we can delineate a hypothetical architectural research where the modality of speed is defined before interactivity, by means of ascribing a different informational velocity to different nodes of, for example, virtual reality. Thus, simulator architecture can become a content formatting factor which induces a cultural inversion of the relation to image.

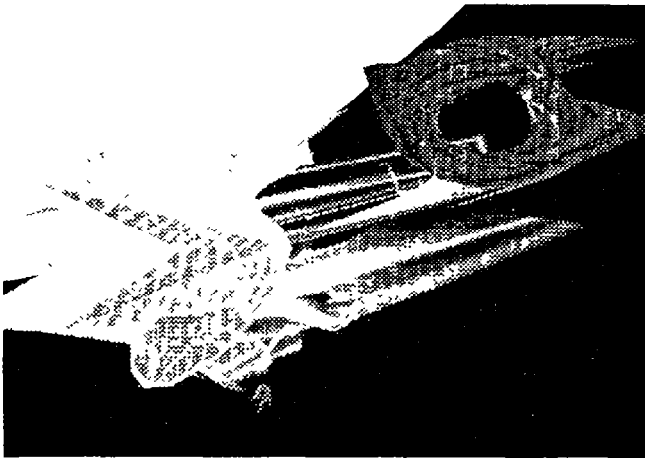


Figure 2

There is another edge, in this approach which relates to Bataille's cultural theory. Decades ago this French theorist described a theoretical model of the economy of waste as a counterthesis to existing restricted economy. Applied to the context of synthetic environment and speed as its formatting property, Bataille's theory finds more stable ground, not only because it is a digested noematic simulacrum reality, but primarily because the topography of speed in its relation to information velocity provides perceptual material which is essentially different from that of ordinary reality, and which can support under ordinary conditions cognitive constructs. One of those is an idea from the dawn of AI studies, which describes the network of users working with shared databases as a global technocerebrum. It is culturally outdated, but not if you are socially disattached within shared virtual reality environment.

Neurospace and Offscreen Resistance

When we face the situation, when points of stability of legal reality, such as a subject of action with its unified complex of personality, spatio-temporal locality and linear logic are not transmitted through the net, we have to question the causation of this alegal resistance. Imagine an illegal action realized via a remote control machinery interface, which the net essentially appears to be; what would be the basis to determine whether the subject of crime was only one person, or a whole group, where each member was responsible for a certain algorithmical step of illegal operation. Furthermore, the personality of the virtual criminal, and hence motifs of crime, also remain quite vague, especially if we consider that all representations including agent of crime, instruments, and actions can be imaginary, hence numerous replicants of these representations are as much real on the net, as the ones which actually disturbed the law. Finally, in between when and where the complex of computer commands was launched and the period and place when and where it was executed there can be millions of miles and hours. The last kick in the shorts, which the remotely manipulated metal

boot of the net gives to the legal system is that all this may be a self organized process, triggered without direct human interference.

In this respect the bioelectronic complex of the net generates a membrane effect, which just doesn't let the legal system through, partially because the latter appears to be based on the strictly human body spatiality, which implies physical disposition of action and meaning. But one important thing is denied by the legal discursive dimension: the sphere of vision, which as an essential part of monitoring has to be pushed away from legal interrogation, because otherwise it would interrogate itself creating the infinite spiral of metareflections.

The representation of the legal one level reflection logic on the net is the one way membrane of the screen: creating the illusion of depth the screen seems to counterfeit the conceptual plane of phenomenological philosophy. Being the base of perceptual vision on one side and henceforth being embodied in human perceptor, the screen is constrained of vision on the other side, where it is embodied in the electronic configuration of technological space. As a hybrid of two bodies and two spaces, the screen is exposed to both visibility and invisibility, the topic of the last writings of Merleau-Ponty right before his death in 1961. In this era of television revival, he writes (his notes were actually entitled *On Visibility and Invisibility*): "This is what Husserl brought frankly into the open when he said that every transcendental reduction is also an eidetic reduction, that is: every effort to comprehend the spectacle of the world from within and from the sources demands that we detach ourselves from the effective unfolding of our perceptions and from our perception of the world, that we cease being one with the concrete flux of our life in order to retrace the total bearing and principal articulations of the world upon which it opens."

In other words, Merleau-Ponty delineates an economy of reflection, which avoids effectiveness of acting in the world and connects it with the eidetic reduction described by Husserl and publicly available on TV twenty-four hours-a-day for the spectators who didn't loose the ability of metareflection. This ability is the basis for contemporary alegal actions, it neglects advertisement time, filters away tasteless music and makes the voices of the governments numb and naked in revealing the recombinatory intelligence patterns of the news.

Before the Soviet Union collapsed, billions of rubles were spent on so-called psychotronic research, which investigated shared invisibility of control. This is one of the factors which critics of media usually omit, that the computer all in all in a historic perspective of interactivity was not the only available instrument. It is a perceptual emulator of analog instruments developed for the variety of purposes. From this point of view a missing constituent for synthetic content becomes visible: the absence of neurological feedback in informational processing is a physical economic resistance, sort of a digital gravity.

In fact, if the net refers to phenomenology, this is only due to its embodiment in the mass media, a difficult infancy, so to say. The screen is what it is only because the media in its legal form was always constrained of multidimensionality. The 3D phenomenon is a good indication of the alegal multidimensional arousal, as it is a harmless placebo imposed on our vision by the legal and economic system. However, the invisible part of the screen remains uncensored, simply because of the fact that the legal system can not by definition include an illegal element, although it can happen in practice. The question of why the invisible body of the screen is illegal has a simple explanation, because it performs the role of mute representational plane of the plant kingdom, which had been a posteroni censored out of human perceptor networks.

The fact that the screen is a perceptoric modulation complex hidden under conventional placebo of perspective first received attention in the seventies, when the advertisement with the invisible subliminal component was widely introduced via the networks of cinemas and TV stations. The following prohibition measures reflected the pathological fear of the law, when it concerns psychotropic effect: even though it was a brilliant marketing technology, subliminal advertisement was prohibited, which was against any economic law. What the legal system was fighting against was an alternative economic attractor, which may have opened virtually a new dimension for the biotechnological interaction, if not only the signs but the products were neuralized.

The economical disposition of powers in global hiatus is reflected in the relations of restricted and unrestricted, or horizontal (such as for example Hegel and Marx theories) and vertical (such as Bataille's economy of waste) economies. If the former one presupposes the effectiveness of action, which a priori can not be fulfilled because of the counteraction, the latter one suggests to refer economic constructs to waste and thus makes the restricted economy of action mutate into the unrestricted economy of vision.

In fact, the first thing which is being violated by aleuality of vertical economies is an onedimensionality of products and production. Analyzed by Marcuse, monodiscursive reality by means of repetition binds mesmerized human consumers to the single dimension of products, which is not even human, but is referred as human, or acts "as if humanified" by the process of mass production. On the contrary the fact that a perceptual modulator is embodied into the legal economic routines fractalizes the vision of the

product to the extent where the borders of real and virtual representations vanish among the millions of multiplied resonances of products, representations, cogitos, psychological triggers, bioreflexes, etc. By spectralizing the mono-reality of production, the prism of vertical economy performs the same role, which psychotropic plants played among other plant species, when the production was strictly biological.

Via the membrane of screen, restricted to eidetic representation by means of vertical economy, we arrive to the neurospace. The economic point of departure, which ends up with the rational fusion of psychotropic and economic activities on the biotronic plane we will call Marxian-Bataillan interface, reflecting its historic origins, horizontal and vertical properties, and prospective effects on the society. It is a selforganizing loop of visionary economy development, which extends mental economic instruments via mass media into the neurospace and organizes mass production accordingly.

On the basis of its perceptual and economic platform, neurospace can be defined as an autonomous hypernetwork of inner-outer inferences of informational discourses. Whether biologically or electronically realized, it theoretically establishes the same conglomerate of protomodel space niches leveled by the modes of perceptual intensities and, hence, correlated with the extent of perceptronic transformation. Further, we suggest a research modelin to the architecture of synthetic content.

Multinode Abstract Rendering System: A Research Model

Synopsis:

M.A.R.S. is a shared virtual reality project based on the internet. It is a research environment into the formative processes of synthetic content as it is deployed in the spatiality of simulation. It is based on perception involving "floating," in some cases stereoscopic three-dimensional visual and audio spaces. In building M.A.R.S., we used true multiprocessing interactive environments which let us connect multiple nodes of virtual architecture to digital representations of cyber-political events. The latter imply various phenomena which carry ideological value for cybercommunity and can include, for example, metaphorical representations of socio-political reality, like the myth of the information highway, or laws on digital censorship, occasional representations of political movements, artificial intelligence research, robotic platforms, et cetera. As a conceptual space M.A.R.S. refers to the functional structure of neural networks, which in order to investigate architectonic aspects of synthetic content is being imposed on external political events. It establishes a kind of hyperspatiality which does not necessarily imply rationality of economic recourses. On the contrary it confronts the clarity of informational cosmos based on the economic discourse and suggests content formatting strategies instead.

M.A.R.S. is supported by Nettropic Content Formatting Network which provides a feed back relationship between the users of M.A.R.S. in forms of multiuser worlds, mailing list, and shared databases, which will form the first repository of general synthetic content.

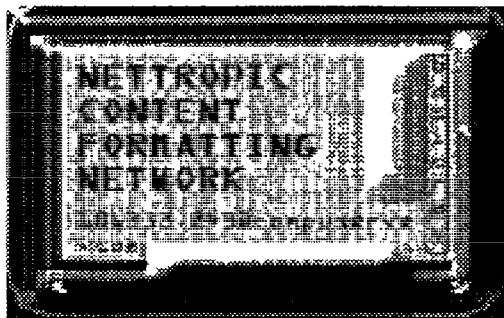


Figure 3

For more information refer to www.dds.nl/~basicray/nettropics.html

M. A. R. S.: Structure and Functionality

M.A.R.S. functionally replicates human informational processing. It is conceptually based on neural network research and its cultural applications in the context of informational and social studies. M.A.R.S. consists of the following elements: spurious collectors, transmitters, content traffic, posted databases.

Spurious collectors, being the first elements which freshly rendered users encounter at M.A.R.S., are single user virtual reality worlds based on perceptually active architecture. As opposite to physical buildings, synthetic constructs suggest liquid, constantly changing configurations and dispositions of elements linked to external events. As such perception and processing of the user becomes a space where actual synthetic content is deployed. For additional information about spurious processes and

neural network principles of synthetic content refer to www.dds.nl/~basicray/dscr.html

The following elements are Transmitters, which represent multiuser domains linked to single user worlds as external events. They provide users with possibilities of analog communication based on their previous synthetic perceptual experience. The communication is realized in form of mobile elements called orbis: which can represent either a world (an architectural file where communication is placed) or an avatar (a temporary synthetic representation of a user in communication) depending on a user's intention to host or join communicational situation. A traditional customized black sun client is used to support this part of M.A.R.S. project, making it easy for numerous visitors to join M.A.R.S. at this level.

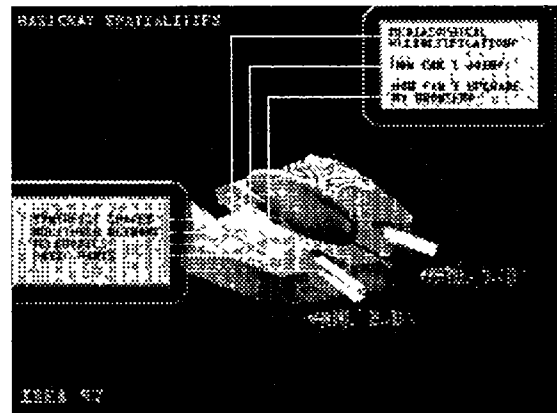


Figure 4

Content traffic is a constant band width allocated by Nettropic Content Formatting Network in order to support M.A.R.S. informationally. It includes mailing list where users can post their synthetic imprints (to subscribe to the list users have to use a mail link on a front M.A.R.S. page), and all related multimedia events. A relative geography of the involved servers includes. Northern California, Holland, Germany, and Russia. Posted databases imply publicly accessible documents where users input and evaluation is listed. Access to full databases will be given to rendered users only.

Repositioning

Multinode Abstract Rendering System (M.A.R.S.) was build as a reflection on what forms digital content acquires under the circumstances when horizontal economic forms are imposed on the vertical discourse of digital hyperreality. Crystallized as a myth about the informational highway, the cosmology of reality simulation found its way straight into the terrain of economic resources providing fruitful soil for transcendental marketing hybrids like cosmoftware or id.

One of the basic pseudoeconomic presuppositions of digital marketeers is rationality in a sence of legal and economic liability of a synthetic space. M.A.R.S. confronts the belief in rationality of hyper-real constructs by providing a simulation space of digital object fusion on perceptual and informational basis. M.A.R.S. architecture is based on crossed spatial markers and attributes which synergize users cognitive map and structurally confronts stability and rationality of cliché informational mentality.

In practice, M.A.R.S. provides a visualization of a current schizophrenic border state of human machine relationship: it contains several virtual reality spaces which serve as irrational links between economically politically and ideologically unlinkable objects like opposite political parties, robotic platforms, and neoluddists, et cetera.

Referring to the irrational part of the simulation, a priori, M.A.R.S. fills the gap in the net created by the dominance of restricted economic interpretation of hyperreality and investigates a full band of synthetic meaning. It asks the question about the ideological nature of digital modalities and in particular bandwidth, the latter being understood as mental and perceptual depth of synthetic constructs in its relation to supporting economic models

As a synthetic content formatting location M.A.R.S. borrows its name from its economic homonym: a target object of N.A.S.A. research. Its name as much as its content are composed of repositioned and reedited profane digital representations of the economy of physical labor in a synthetic space. N.A.S.A. is just another metaphor.

Rendering

To be rendered by M.A.R.S. means to be perceptually involved in its simulatory architecture, support synthetic communication, and to participate in shared processing and databases.

M.A.R.S. renders individual and collective digital representations in the same way an image can be rendered on the plane of simulation in content development editors. By linking existing representation to a certain moment in abstract visual sequences, M.A.R.S. renders perceptual properties to otherwise invisible discourses of power. To a certain extent it is a simulation of Panopticism, and as such it is a great deal connected to the meaningfulness of architecture in its relation to the position of the image. Constructed of purely synthetic hyperreal imagery M.A.R.S. distributes momentary properties of this imagery in between existing semantic structures ascribing new dispositions of synthetic content to borrowed ideological constructs.

Opposition set, update, and feedback

Links, avatars, imagery, and discursive sequences can be submitted by rendered users and will be used for further development and refining of M.A.R.S. architecture. There is only one condition which all of them have to fulfill: every link, et cetera has to be submitted in relation to the context in a way which will bring another view or interpretation on the external event or its references. Upload and download areas for content and form exchange at M.A.R.S. can be accessed via M.A.R.S. rendering pages

Technology

The elements of M.A.R.S. are based on D 96 (mainly collectors), VRML 2.0 (mainly transmitters), VRML 1.0, JAVA, and HTML standards. The above statement doesn't imply that any other standards cannot be temporarily or permanently used.

Disclaimer

M.A.R.S. and its developers and users are not responsible for any actual events or representations involved in the projects. All project elements are rendered as formatting parts of synthetic content, and should be correspondingly interpreted.

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Content and Discontent: An Alchemical Transformation

In its desire to be free from the form/content coupling, form ingested its content partner and re-presented it as information, information which "just wants to be free." And, while science and technology have been taken up with cultural critiques of their "neutrality and transparency," information, gathering speed in the computer age, has managed to slip away. In this paper, I explore my discontent with information by asking what has happened to subjectivity in computer culture as we become ever hungrier for information. Although alchemy is not so much a theory as a practice of knowing and doing, I want to suggest that it offers insights and inspiration for this exploration. I will begin my alchemy of information with a moment of separation.

Separation:

Take a deep breath, pass through the gate of separation, and face the anxiety of the will.

Separation... anxiety – this is the title of a sound work of mine which I would like to recall (and later play) here – *Separation Anxiety: Not the Truth about Alchemy*. While the title does have a certain obscurity, as with any alchemical text, it also condenses two aspects of alchemy I am particularly interested in. "Separation" is one of the 12 "gates" or stages of an alchemical transformation. "Anxiety" refers to a cultural moment where truths are no longer comfortable and comforting. It is an anxiety/crisis of "will" and its morality. [Alchemy presents an ideal mode of rethinking that dominant moral concept of "will" as a basis for action because alchemy is about suspension of will and allowing things to manifest. (Marshall, S.A.)¹]

My method in *Separation Anxiety*, which I want you to follow with me here, was to enter the gates of alchemy – separation, solution, circulation, putrefaction – to allow alchemy to do its dirty work. I offer alchemy as a voyage, not forward, but down... to the putrid, smelly depths of lies, untruths and noise. Here information can be confounded and undone – rendered *inform*: archaically, etymologically, *inform* was shapeless, without form, unshaped. With its bodiliness, dirt, and deception, alchemy can transform the clean wilful subjectivity of information; it can unmake the controlled body that hungers for information, from within.

Alchemy recalls histories and cultures when body and mind were not split; when nature was not out there, a standing reserve, to be penetrated and controlled by science or romanticised by art. With the crisis of modernism, alchemy as a metaphor also offers artists a way of continuing to speak about their crucial **material** relationship with their work – about the materiality of the work. In the practice of alchemy, the subject who seeks to know is transformed by the knowing. Because it involves a connectedness to one's work that is physical, psychological, emotional and intellectual, it's not surprising that alchemy as a metaphor and a practice resonates for many artists today, including electronic artists. To produce *Separation Anxiety*, I drew on the works of electronic artists and critics, such as Julia Scher and Jeffrey Schulz – artists directly or indirectly alchemical in their methods and interests.

Alchemy is elusive as well as corporeal. On the surface it seems to combine art, science, philosophy, and religion; yet it is different and external to them. It is not about will, truth or transcendental mean-

ing, nor about regularity and categories, but allowing things to manifest in their particularity and singularity. (Marshall, S.A.) Its enigmatic and poetic concepts are not intellectual abstractions but emotional and physical as well. (Marshall, S.A.) experienced within the body as an intelligence.² Alchemy is an Artaudian **theatre** of corporeal performance: it is a performative body technique³

As Artaudian theatre messes with the senses and the kinaesthetics of the actor and the audience, alchemy too disrupts the hegemony and privilege of vision over hearing and its separation from touch.⁴ Alchemy thus configures the alchemist and their senses differently from a scientific discourse. That discourse, according to Jonathan Crary, in the 19th century contributed to a reconfiguration, a separation of the senses with the disassociation of sight from touch.⁵ He sees that moment of the remaking of vision and its objects as part of the remaking and abstracting of the modern bourgeois individual – "remaking the individual as observer into something calculable and regularizable and of human vision into something measurable and thus exchangeable."⁶ This is the individual, the subjectivity geared up to access information – as measurable and exchangeable as itself. This is the subjectivity and the information ripe for the alchemical undoing.

Separation:

Take a deep breath, open the gate of separation, and face the anxiety of the will.

Separation... separate to recombine. When you separate to recombine the dirt and noise out of/into information, you can undo the compulsive cultural and technical drive for clean information. And you can make tangible the way we are being trained to see this as a drive from within information itself, the way we are being habituated to experience information as wilful and willed. You can begin to question the way information just "wants to be free." Free as free will? This is information offered as an acting out of your will, as a means of control, but in an impossible way, an anxiety-producing way, since of course you never can have control of information which is so vast, changeable, impalpable and as slippery as quicksilver. (Dyson, S.A.) This is the elusive information that we have learned to desire and to need to access...

Quick as mercury, information is propelled along its speed trajectory. So swift, it would be, as to leave no traces, no contamination. As if the same everywhere, everytime, escaping from temporality and its anxieties, and from spatiality – abstract in the sense of cut off from any traces of desire at its source,⁷ and from the corporeality of its content. Slippery as it is in character as well as method, information feigns to allow corporeality to come into a new focus – as... information. But meanwhile you are being habituated to understanding corporeality only biologically (and to understand biology as truth), so you forget culture and history as determinants of differences like gender, sex, race, ethnicity. Now there is (only) DNA to inform you fully of who you are and to form you fully.⁸

So information theory, which once bound information inextricably to noise, is being wiped clean of noise, reduced to a "theory" of access/able information. Information has been reified, hypostasised, as if self-evident and self-generating, reduced via calculation to a sort of sameness (refusal of difference) which is the basis of exchangeability.⁹ This reductive expansion of information follows the inexorable logic of *capitalist* modernisation, which Jonathan Crary describes as driven by a logic of the same, the making exchangeable and circutable that which is singular.¹⁰ [Information – a noun that has cut itself free from the verb. we are in formation – orderly; it is free.]

Information just wants to be free... free and mobile as the ideal masculine democratic subject? On the political front, happiness and equality had to be measurable and visible for bourgeoisie.¹¹ No surprise then that access to more and more information becomes a measure of the happiness. And information becomes a fetish, a commodity fetish, mystifying its moment of production, in noise. Information is the commodity and the currency. The "information poor" without it, without "access" to it, are seen to lack value, appear worthless, indeed somehow inherently lesser. Information thus becomes/defines/offers a new "global" economy and culture, and it needs a new subject, the global subject – an accessor rather than producer, a subject who is docile and useless – a generation beyond Foucault's docile and useful subjects. Now it's the information that is useful and the subject is identified by its information – DNA – training us to wonder, anxiously, who we are so it can tell us.¹²

Information is a commodity that reveals the essence of commodities – their desire, their will to circulate, be free, be in the free market, in the free world. Information wants to be free – it's calling you to free it – to access it – challenging/beckoning you – just as "nature" once beckoned to be revealed – "asking for it."¹³ Now that information has the will that you must obey, you are somehow lacking in will. It's not surprising then that this information becomes addictive. For as Eve Sedgwick suggests, addiction as a figure and force is actually about producing a subject who has free will.¹⁴ [The alchemical separation makes a hash of this anxious habit of information junk.]

Solution:

Glide through the gate of solution.

Solution and dissolution – a dissolution of the clarity of information and the fixity of truth. In the alchemist's solution, familiar symbols disperse and encrusted truths dissolve. As Jonathan Marshall explains:

"a symbol will not necessarily mean the same thing from one alchemist to another ... You don't actually have a 1-to-1 correspondence between words and things (Marshall, S.A.)

And alchemists can deliberately deceive, since certain things which are 'false' can be useful. Unlike science, alchemy is not about fixity, regularity, and reduplicability; but about things which are temporary or may only happen once in someone's lifetime (Marshall, S.A.) In the solution you seek the instabilities that begin the transformative process; (Marshall, S.A.)... instabilities that lie dangerously close to schizophrenia.¹⁵

Boundaries become permeable, break down. Alchemy is not, after all, an easy practice. Many alchemists went mad, their sanity eaten away (sometimes literally) by the mercury they worked with. Mercury is a solvent which itself violates categories; a metal which is liquid at room temperature. Mercury... fluid and bouncy (Marshall, S.A.)

Bouncy. Electronic/digital artists Jeff Schulz and Julia Scher develop works which play with the idea, the materiality, of an identity which bounces around the world informationally. Schulz performed as the "cyberblading alchemical nomad", rollerblading up and down Manhattan, doing transactions at automated teller machines, transforming base plastic into gold.

Their work dissolves the easy, self-evident nexus of information and identity — giving us a new sense of what is happening to identity in an information culture, as, according to Schulz, people experience what it's like to have their personal information, parts of themselves, travelling through the air. (Schulz, S.A.) As he says,

*"The air has been transformed for us... it has been made into a medium of information and there's nothing we can do about it, we just have to breathe it." (Schulz, S.A.)*¹⁶

In this dissolution of identity and information, you sense in your very breathing body the inevitable, ultimate connection between corporeal embodiment and information [which Katherine Hayles invokes].¹⁷

Circulation, Calcination, Sublimation: Enter next the gates of circulation, calcination, and sublimation.

Experience the process of alchemical laboratory work. Alchemy may be a sublime process, but not a speedy one. "There is a quick way," as Marshall points out, "but that takes several days, as opposed to the slow way, which can take years." (Marshall, S.A.) This is a meditation that is not transcendental but physical and at times, of course, boring (Cotnoir, S.A.). But, you cannot separate what happens within the alchemist from what happens in the laboratory (Marshall, S.A.).

Circulation. As electronic artists calcine the information out of the circulating air,¹⁸ we can now experience the information filled air as an ether, full of ghosts and spirits; and we can grasp information as more than just a commodity. In breathing this air, we do more than consume information, we enter this ether, "another space," according to Frances Dyson, that is "almost peopled, almost inhabited... (and) has a kind of consciousness about it." She argues that information is not just about consumption from the outside but somewhere where you are, a space of being that you have to somehow negotiate yourself in/to, work out how you are able to be within. (Dyson, S.A.).¹⁹

Little wonder that in this information culture, telepaths and psychics are having a major comeback on the electronic airwaves, where psychic energy is exchanging with electronic energy (Scher, S.A.). Reviving the alchemical process of projection²⁰ and reminiscent of an earlier moment in technological culture where sound waves bounced through a ghost filled ether... a moment whose traces the oh-so-clean-digital would erase, traces of noise and dirt.

Putrefaction and Fermentation: Through the gates of fermentation and putrefaction.

As you enter these gates, you encounter the return of the repressed, the dirt, and the noise. With an alchemical knowing you can experience a more productive side of information — in the very dirt and noise and static. Here in the fermentation you experience something more than chaos, which so often held order at its heart. In the putrefaction you can recognise information ineradicably connected to noise, as Friedrich Kittler, traces.²¹

Here in the putrefaction and fermentation, there lies a mire of questions: What does it mean to repress this connection by cleaning up the noise? Where does the desire come from? Here you can struggle against an information which has been not so much ex-propriated or ap-propriated but propriated (propered - propriated) — turned into a glamourised product and sold.

Putrefaction and fermentation. The moment of putrefaction is bodily. All your senses are assaulted. This is a moment resonant with Julia Scher's "dirty data" and other smelly works. The alchemist smells the decomposition of a dead animal, hears the noise of the dung beetle, recalling the stench and noise of the transformative process within ourselves.²² Your clean and proper, noiseless bourgeois subject's body²³ is being undone in the putrefaction.

If everything is information and information is everywhere, then distinctions collapse — recalling a

collapse of the distinction of subject and object, which is the threatening maternal space.²⁴ The culture of information addresses the new subjectivity it produces — taking us not so much forward as backward, to the 50s (its own heyday) — a high moment of Motherhood, biological determinism, fear of difference, and cult of sameness. But in the putrefaction such a would-be clean moment ruptures and you experience an "Abjection" with a different, devouring "Mother" at its heart.

The Hyperformer experiences this devouring as an ATM machine eats a plastic card. When he uses an ATM, he performs a re-enactment of the symbolic connection with the mother...

But as you mire in the putrefaction, you go beyond abjection, you are more thoroughly undone.

Nigredo.

It is during the **nigredo** of alchemy, which might occur at any gate, that you come most thoroughly unstuck. A moment of deepest despair so familiar and resonant for most artists. You are plunged into something awful, but essential. There is a raucous cacophony of pain/noise — beetles, ravens, green lions — human/inhuman caterwauling that echoes, redoubles and exceeds the noise of Michel Serres in his most multiple unpredictable turbulent moment.²⁵

[The nigredo is not so much a sea of data to immerse yourself in, during the sort of oceanic moment that initiated Freud's exploration of discontent.²⁶ It is not so much even that you become the data, which, as I've suggested, is by now our daily experience. Rather] the nigredo is an intensity of mattering, of meaning/meaninglessness, of noise and information, an intensity so great and terrible that there is nothing left but to do the Work. It is a moment of "living, intense, indelible experience" where, as Julius Evola describes, "it is not a question of a body, which, upon disintegrating loses its soul, but of a soul so concentrated in its power that it unmakes the body."²⁷

Conjunction, Exaltation, and Multiplication: At last the gates of conjunction, exaltation, and multiplication. The final gates, if there were such a thing.

Conjunction... here the grotesque hermaphrodite can appear — the progeny of force and violence, of violation of categories. The hermaphrodite is a completely new state, no longer male nor female, but conjoined together. (Cotnoir, S.A.).²⁸ In the Conjunction, information and noise are mixed, miscegenated, into a grotesque hermaphrodite. This hermaphrodite queers the easy glamorous soft-sell sex of information, which like the sex Foucault unravelled, was so disciplining and surveilling.

Multiplication This is a process of transmutation through intensity in alchemy.²⁹ You experience this now as you can revel in an excess and overload of information so great it re-turns to noise. This overload of information, like the excess of impressions which gave Nietzsche indigestion,³⁰ finds its cure not in refusal but abandonment. So now faced with information and all its conceits, the response may be not so much to take smaller digestible bytes — the gestures of access and control — but to make it thoroughly indigestible and unmanageable, so that its instrumental and abstract quality is broken down.³¹

Exaltation. In this quintessential moment of alchemy, you can recognise what it would be to become one with information — not in sense of reducing yourself self to information in a genetic obsession — nor even attaching yourself to it in a Cyborg fashion — but in experiencing a work that complicates information and our relationship to it, as Schultz and Scher do, in a troubling and troubled way.

Acknowledgments

I would like to thank Jonathan Marshall (Department of Anthropology, University of Sydney, where he is currently completing a thesis on "Imagination: Alchemy and Cyberspace") for insights and inspiration about alchemy. Jeffrey Schulz, Julia Scher, Brian Cotnoir, Frances Dyson, Ann McCoy, and Laura Trippi also generously agreed to be interviewed for *Separation Anxiety*. *Separation Anxiety* was commissioned and broadcast by *The Listening Room*, ABC Classic FM, Australia. It is distributed in the U.S. by New American Radio and Performing Arts, Staten Island, New York.

Footnotes

1. References from *Separation Anxiety* (hereafter S.A.) will appear in the text, in parentheses. Last names only will be used in these notes, to abbreviate as follows: Marshall for Jonathan Marshall; Cotnoir for Brian Cotnoir; Dyson for Frances Dyson; Schulz for Jeffrey Schulz; Scher for Julia Scher.
2. Julius Evola, citing Geber, says: "the intelligence has its seat in the heart, because that is what precedes all the other organs" and then continues in a footnote "It follows from this that it is a question of the deep intelligence, from that which presides at the same processes of the organism, of which the waking cerebral consciousness knows nothing by direct experience. This was intuited by Nietzsche, when he spoke of 'the great intelligence of the body' as distinguished from the merely individual faculties." Julius Evola, *The Hermetic Tradition: Symbols and Teachings of the Royal Art*, (trans. E.E. Rehmus) Rochester, Vermont: Inner Traditions International, 1971. p. 83
3. Evola, op. cit., p. 117, speaks of "exercise," "technique" and "habitus" as part of alchemical practice. In relation to theatre in general, it is interesting that one of the key texts about

- alchemy is *Theatrum Chemicum Britannicum*.) The connection between Artaudian theatre, in particular, and alchemy is not metaphorical. Artaud was interested in alchemy and many of the characteristics of his theatre of cruelty are alchemical in origin and resonance. Even if Artaud's performative emphasised the deformation as much as the transformation, an understanding of alchemy puts Artaud in context and also brings out alchemical resonance in the modernism which Artaud exemplified. The resonances with modernism, which I suggest in this paper, include the refusal of transcendental meaning, concern with materiality and corporeality etc. In Artaud's work, see e.g. "The Alchemical Theatre" in Antonin Artaud, *The Theatre and its Double*, New York: The Grove Press, 1958, pp. 48-52. See also Jane Goodall, *Artaud and the Gnostic Drama*, Oxford, Clarendon Press, 1994. Even though Goodall sees Artaud's agon as Gnostic, which has a separate, if sometimes overlapping history and character from alchemy, her discussion are very important and insightful. For a discussion of the Modernism, with which I am arguing alchemical resonances, see Friedrich A. Kittler, *Discourse Networks 1800//1900*, Stanford: Stanford University Press, 1990.
4. For instance, as Jonathan Marshall explains, alchemy is more attuned to overhearing than to visually with its laying things out discretely in a visual field. Overhearing figures in the work of Paracelsus to convey a practice of listening to the knowledge that things already have. For example to 'know' about a pear tree or a curative root, you need to "overhear" the knowledge of that root (Marshall, S.A.) As Paracelsus says: "When you overhear . . . the knowledge which it possesses, it will be in you just as it is in the" root. Walter Pagel, *Paracelsus: An Introduction to Philosophical Medicine in the Era of the Renaissance*, Basel: Karger, 1982, p. 60 Overhearing is also a hearing of things simultaneously, superimposed, noises not separate but added together to transform the whole of what you're hearing. (Cotnoir, S.A.)
 5. Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*, Cambridge, MIT Press, 1995, p. 19
 6. *Ibid*, pp. 17, 19
 7. Avital Ronell speaks of "the feminine trace deposited in technologies" in Avital Ronell, *The Telephone Book: Technology, Schizophrenia, Electric Speech* (Lincoln: University of Nebraska Press, 1989) p. 443
 8. This is a cultural move parallel to the way psychoanalysis was reduced to ego psychology, thus eliminating the fearful and messy unconscious. Sherry Turkle, *The Second Self: Computers and the Human Spirit*, New York: Simon & Schuster, Inc., 1984, p. 291
 9. According to Crary "emergent technologies of image production" are "relocating vision to a plane severed from a human observer". Crary, *op. cit.*, pp. 1-2. "Increasingly, visuality will be situated on a cybernetic and electromagnetic terrain where abstract visual and linguistic elements coincide and are consumed, circulated and exchanged globally." Crary, *op. cit.*, p. 2., italics mine.
 10. *Ibid*, p. 10.
 11. *Ibid*, p. 11.
 12. Heidegger, with typical incisiveness, suggested that "as soon as what is unconcealed no longer concerns man even as object, but exclusively as standing-reserve, and man in the midst of objectlessness is nothing but the ordered of the standing reserve, then he comes to the very brink of a precipitous fall; that is, he comes to the point where he himself will have to be taken as standing-reserve" Martin Heidegger, *Basic Writings. from Being and Time (1927) to The task of Thinking (1964)*, (ed. David Farrell Krell) San Francisco, Harper, 1977, p. 332. True to its nature as a commodity fetish, information may seem essentially different from durable goods and access may seem different from ownership, in a way that Katherine Hayles suggests in the first part of her essay. (See footnote below) However, I would argue against any seeming neutrality of information because capitalist relations structure information as deeply as they do durable goods. For instance, as Charles Bettelheim demonstrated in his critique of economist versions of early Soviet history, capitalism's effects come from more than just ownership of the means of production. Capitalism works, he showed, because it structures the producers themselves, through the relations and character of that production with its hierarchies and techniques. Charles Bettelheim (transl. Brian Pearce), *Class Struggles in the USSR: First Period: 1917-1923*, New York: Monthly Review Press, 1976.
 13. Heidegger, *op. cit.*, p. 326. Indeed, information wants you to reveal it at the very heart of nature. As Heidegger suggested in relation to physics' compulsion: "that nature report itself in some way or other that is identifiable through calculation and that it remain orderable as a system of information." p. 328
 14. Eve Kosofsky Sedgwick, "Epidemics of the Will", in Jonathan Crary and Sanford Kwinter (eds.), *Incorporations: Zone 6*, 1992, p. 586
 15. In that madness of dissolution you might overhear a strange affinity between alchemy and technology – an affinity that once sent science running for cover. Avital Ronell, for instance, crossing a few wires and listening into the static, found in the genealogy of the telephone a "mysterious coupling of art and occult". She contends that, "the scientific imperative, the demand in the nineteenth century for an epistemologically reliable inquiry into the nature of things, derives part of its strength from the powerful competition represented by fascination for the freak and the occult, which is always on the way to technology. Science acquires its staying power from a sustained struggle to keep down the demons of the supematural with whose visions, however, it competes. The repression of this terror produces the counterfeited tranquillity of sound scientific procedure. Science is always an operation on horror, opening the theatre of its repression" Ronell, *op. cit.*, p. 366-7.
 - Not surprising then, that Ronell's telephone, like alchemy finds an affinity with schizophrenia. Alchemy and schizophrenia – a connection that Erik Davis, in his alchemical encrypting of information, also notices in some readings of SF. Erik Davis, "Technosis, Magic, Memory" in Mark Dery (ed.), *Flame Wars: The Discourse of Cyberculture*, (Durham: Duke University Press, 1994) p. 52. Davis's alchemy of information works on SF texts rather than electronic art and approaches alchemy and gnosticism from the allegorical, mythic, cryptic angle. Though I would question too direct a parallel between a hermetic and cyber approach to information (in that it doesn't allow for the sort of economic/political concerns I am trying to raise), and though I am personally alienated by his mystical New Age moments, I still find Davis's work very rich.
 16. This recalls the importance of the breath in eastern alchemies.
 17. Katherine Hayles, whose work is always exciting and important in any rethinking of science, information, and culture, is perhaps somewhat ambivalent on this point, as she herself notes; but in the end she argues strongly and politically that "Information, like humanity, cannot exist apart from the embodiment that brings it into being as a material entity in the world." N. Katherine Hayles, "Virtual Bodies and Flickering Signifiers," *October* 66 (Fall 1993) p. 91
 18. The work of Australian electronic artist Joyce Hinterding is also interesting here in the way she allows all sorts of information in the air to spark her work
 19. Ronell makes a similar point, reminding us how the telephone is already "a place without location, from which to get elsewhere" – inhabited by "vaporous phantasms" Ronell, *op. cit.*, pp. 305, 322.
 20. Evola, *op. cit.*, p. 194.
 21. "The creaturely sounds that filled the language space of the sixteenth century were silenced when Man became aware of a beloved language or a woman's voice. The inhuman tone behind Nietzsche's back is not the speech at the beginning of articulation; it is not speech at all. All discourse is powerless against it because all discourses add to it and fall prey to it. Within the realm of all sounds and words, all organisms, white noise appears, the incessant and ineradicable background of information. For the very channels through which information must pass emit noise" Kittler, *op. cit.*, p. 183.
 22. In Scher's work, this is the smell of a work station configured to make us work harder. The dung beetle is the scarab of ancient Egypt, a reminder of alchemy's roots (though this is admittedly a complicated and moot question) further back than the Ancient Greece that modern philosophy echoes and creates as our most significant origins – a tiresome and worrying gesture when we recall that it came into vogue in the Romantic era in part as an anti-Semitic refusal of recognition of Egypt. Martin Bernal, *Black Athena: The Afroasiatic Roots of Classical Civilisation, Volume I: The Fabrication of Ancient Greece 1785-1985*, New Brunswick Rutgers University Press, 1987. see esp. p. 28-29, Ch. II, IV.
 23. Peter Stallybrass and Allon White, *The Politics and Poetics of Transgression*, (London: Methuen, 1986) Chapter 3.
 24. Mary Ann Doane, "Technophilia: Technology, Representation and the Feminine" in Mary Jacobus, Evelyn Fox Keller, Sally Shuttleworth, *Body/Politics*, 1990, p. 170.
 25. Michel Serres, who is (more than) a philosopher, scientist, and poet, is engaged, I would argue, in an alchemically resonant project to couple information essentially with noise and to make it destabilise the body (as negentropy, as flow). At times, though, it seems that Science and Romantic attachment to the generative Mother perhaps rope him in: e.g., when he figures the Mother's generative chaos, the water-woman-matrix noise, and disorder which is a "more exquisite order still" I would suggest that because alchemy is outside of science, religion, art, philosophy, it enables a different practice here, opening a place that does not require women or woman nor the oriental, non-western, "information-poor" as its enabling tropes. Michel Serres (transl. Genevieve James and James Nielson), *Genesis*, Ann Arbor: The University of Michigan Press, 1995, e.g. 96-100, 57-60, 107-115, 130-135; and Michel Serres (ed. Josue V Haran and David F. Bell), *Hermes: Literature, Science, Philosophy*, Baltimore: The Johns Hopkins University Press, 1982, pp. 73-83.
 26. The sort of sea of data that Serres would immerse himself in. Sigmund Freud uses the figure of the "oceanic feeling" as the catalyst for his exploration of religious feeling in Chapter 1, *Civilisation and its Discontents* (transl. Joan Riviere, Ed. James Strachey), London: The Hogarth Press, 1975.
 27. Evola, *op. cit.*, p. 105. I bring this death in here, in the alchemical spirit, to point somewhere, though in fact for Evola, or so he says, it belongs at the stage of dissolution
 28. This figure is not so easily understood, certainly not to be confused with some New Age sick-

ly sweet unity and harmony. It is instead a creation that takes place Elsewhere, the 'virtual' actualised; and, by the way, its moment of creation gives the lie to the tired old story of creativity as womb envy, a story that purports to unveil patriarchy but in fact anchors it all the more strongly in an essentialised and mythologised Motherhood. Here I am taking issue with arguments like that of Sally G. Allen and Joanna Hubbs, "Outrunning Atalanta: Feminine Destiny in Alchemical Transmutation", *Signs*, 1980: vol. 6, no. 2

29. Cited in Crary, *op. cit.*, p. 23.

30. *Ibid.*, see p. 24.

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Follow the Yellow Brick Road!

Fantasies of Center and Presence in Net Culture

Microsoft's well-known slogan "where do you want to go today?" gives promises of unlimited mobility controlled only by the person on the keyboard. I will be looking into instances, when this hype rhetoric (which bypasses the basic question that the will "go somewhere today" is limited by such mundane socio-economic factors as access and bandwidth) reappears in political discourses, especially in educational politics. In these discourses Internet and digital cultures are represented as promises and challenges of tomorrow, and investing in tech as a meaningful act in itself – literally, an investment in the future.

The Finnish Ministry of Education¹ has a very ambitious program of having all comprehensive schools wired and extensively equipped with computers by the year 2000. Secretary of Education, Olli-Pekka Heinonen, has repeatedly characterized this as an important shift towards information society, a tomorrow land made true with the help of computer technology and Internet, and inhabited by the children of today. What is actually done with the machines and Net connections in the everyday school practices, however, remains a mystery to all, as there is yet no regulation, or functioning schemas concerning this.² One is led to think that children are learning to surf, especially since Heinonen is constantly shown on television interviews in this "favorite pastime of his". In the media discussions concerning the Net and education focus solely on technology, not on its uses, impacts, or implications.

Similar rhetoric of Internet-saturated future was used also by Marjut Lauristin, Estonia's former secretary of social affairs, in the 1995 Interstading conference. In her presentation she emphasized the importance of Internet and computer literacy for Baltic countries. According to her, via Internet former Soviet nations can shift themselves to the center of things – bridge the gap created by 50 years of Soviet rule, and join the community of Western nations. It is as if youngsters of today, at home in the data-world, will give the nation the modern face needed for its successful marketing on international scale.

The discourses of Lauristin and Heinonen postulate two protagonists, namely, Nation (Estonia/Finland) and International Community (European Union, Western developed countries, financial power centers, etc.). These ideological points of reference are posed unproblematically as entities with seemingly solid positions: Internet, again, is posed as the channel through which the nation as protagonist can overcome burdens of space – even time and history.

These models picture information highway as a post-local equivalent of L. Frank Baum's famous Yellow Brick Road outlined in the *The Wizard of Oz*. The long and winding road full of surprises and challenges leads to the gleaming and magical Emerald City. Once there, the city's gouverneur, a powerful wizard, can give the travelers just what they are lacking: brains, courage and a trip to Kansas – or progress, access, and presence in the "heart of action". I find this parallel to imaginary lands of Oz quite appropriate, since when discussing Net space we are discussing a non-space which is constantly conceptualised through different fantasy-saturated schemas and spatial metaphors.

Even if the info highway surpasses geographical boundaries, the national, economic and cultural ones are unlikely to be effaced. When former centers of political and economic power are shifting radically in the age of globalization, multinational flows of capital, migrancy and media saturated cultures, nation states are not crumbling down, but seeking new alliances. European Union, for example, can be seen as an attempt to create an economic and political alliance linked ideologically to somewhat imposed discourses of "our European identity and culture".

Gaining concrete political power in the Union is rather difficult for Finland, a small eastern-Nordic country currently overcoming serious recession and suffering from mass unemployment. In this situation Internet is, in the rhetoric of Heinonen and the like, pictured as the pass to future. Since Finns are already among the leading nations in using Internet per capita, we have fair chances in the promised future situation, a world communicating through Internet, where Finland would – unlike in the EU – be over-represented. The chain of thought is overly national: our children will be the troops fighting for nation's space on the Net – Net equaling here the center; both the Yellow Brick Road and Emerald City. This rhetoric was well put to words by Blue Wings, magazine of flight company Finnair, promoting Finnish companies and culture:

"The Internet is one of the main promoters of the Finns' internationalisation. Communicating through the Internet and by e-mail comes naturally to the young. . . Johannesdahl (representative of Telecom Finland) admits that it gives national pride a boost to know that Finland is first in several sectors in telecommunications technology and internationally recognized as a pioneer. In Germany, for example, the level of e-mail use is only what it was in Finland at the end of the 80s."³

I argue for a need to rethink these issues of nationalism and reorganization of periphericity, for it leads both to mystification of new information technologies, and enables political manipulation. As no one knows what Internet will be in 10 years, and rare politicians seem to have any grasp of it even today, predestining the medium as tomorrow's ground is rather naïve. It helps to avoid focusing on more graspable socio-economical issues, as well as political aspects of Net culture. For me it is clear that the center of things in terms of power is certainly not to be found from the Net, or the EU for that matter. Capital might not have a home country, but it neither is floating somewhere – it is tightly bound to corporate structures focusing increasingly in the fast developing economies of Eastern Asia. Centers are economic ones; although they are perhaps more diffuse, less bound to national boundaries, they are no less defined.

The Wizard of Oz, one of the icons of Americana, brings us to the often posed question of which culture is the culture that goes most global, which language is the language of globalization and of the info highway, where does Internet or Microsoft originate? To make things a bit more complicated: if Internet and the "global scene" mediated through it are equaled with the "West", the new frontier (the way out for countries with former strong alliances to Soviet Union) what does it mean that power (equaling money) in "the West" is increasingly coming from Asia?

Again, the rhetoric of Internet as progress, emphasizing technology and techno-fantasies in stead of questions concerning uses or contexts, is mainly profiting corporations. After all, machines do come from somewhere to schools, and in schools children get socialized to using them – and this increases consumption on the home market. Internet is a commercial zone with its 24-hour shops and pay per minute connections.

To make a brief parallel, Frank Baum, the author of *The Wizard of Oz*, made his career in an overtly commercial branch, designing window displays. From 1897 on he edited a pioneer professional magazine "Show Window", and in 1900 his book "The Art of Decorating Dry Goods Windows" gave in-depth advice in creating fascinating scenes in shop windows in order to attract the interest and will to shop of a passer-by. Window displays, these wonderlands of consumer goods, were built, according to Baum's concept, with electric lights, bright colors and colored glass.⁴

In *The Wizard of Oz*, the wizard using all these spectacular devices to create illusion of power is revealed as a charlatan, whose power only comes from the fact that the people of Emerald City blindly believe in it. Dorothy and Toto the dog can return home to Kansas only with the help of her will power. The moral of the story is that it is no authority, but individual enterprise, that makes the difference – and there is no place like home, however mesmerizing the technocolored fantasy lands might seem at first glance.

In the discourses of Heinonen and Lauristin, Dorothy's have taken over the scene. Private enterprise is still the key word, but motivation behind it is articulated as "the nation's benefit". As children will be educated in computing from an early age, they have better changes in the job-market, and with computer literate staff Finnish corporations will have better positions in international competition (future is here assumed as being one of national companies in stead of more hybrid forms of capital). Free to surf between the assumed center of things and home, these subjects are given the utopian task to reorganize space and power, indeed, to shift Kansas a whole lot closer to the Emerald City.

1. <http://www.minedu.fi/QPM.html>

2. In the ministry's program "Finland Into an Information Society", more than 130 million FMK (\$25 m) are reserved solely for purchasing new machines to comprehensive and secondary schools, practical colleges and universities. Meanwhile, 1,5 MFMK (\$300 000) is reserved for further education of teachers responsible for the actual computer-aided teaching on daily basis, and around 20 MFMK are reserved for developing new computer-aided methods of teaching.

As computers will be purchased within two years, by the time the contents and outlines of teaching will be even somewhat clear and teachers will have had basic education in computing and new teaching methods, the machines will already be outdated, and new purchases will be inevitable. Instead of first planning the strategies and then executing the plans, all should be done simultaneously. It is as if the feeling of being left behind from the train of progress vocalised in the ministry's memorandum could be corrected through immediate investments. See <http://www.minedu.fi/tietostrategia/>

3. Hannu Virtanen, "Spreading the Net for a Wider Web," *Blue Wings* Aug -Sept. 1997, 53.

4. Anne Friedberg, *Shopping Around: Cinema and the Postmodern*. University of California Press, 1993, 66.

The Foregrounding of the Issue of Space

If indeed, the medium is the message, the issue that accompanies many of our discourses about the digital, is that of emergence. Utopian promises are always emergent, and deferring to tomorrow, lack the rigor necessary to radically examine our concerns. Salvation is promised it will emerge, as soon as this or that problem is solved, and we are asked to display more than a degree of evangelical faith. Even worse, we experience the invention of terms, which at their limit should be taken hyperbolically, but are offered to us as theory. But in considering an attack on such utopian thinkers, one often finds redeeming facets to their thought, perhaps due to the magpie nature of their rhetoric. But what if we were to take a step back from this situation and consider the issue of emergence not as an issue of tomorrow, but as an intrinsic phenomenon of the digital, a phenomenon which lends this quality to our discourses? What I therefore propose, is that we deal not with an emergent phenomenology, but a phenomenology of emergence. McLuhan stated that "The effects of technology do not occur at the level of opinions or concepts, but alter sense ratios or patterns of perception steadily and without resistance. The serious artist is the only person able to encounter technology with impunity, just because he is an expert aware of the *changes* in sense perception."¹ Thus McLuhan offers us a more tangible starting point than the unfulfilled promises of tomorrow.

How then are we to approach the phenomenology of emergence? McLuhan clearly makes a claim for this, not through sense perception, but its *alteration*. It is through the alteration and rupture of space that I intend to draw out the themes which lead us to a sense of emergence, and if we are to think emergence, that from which things emerge. My interest in the spatial began as a consequence of an engagement with the "expressive space" generated through sculpture and installation. Having worked with the human figure, the concept of an expressive space mediated by the 'I can' of consciousness originally seemed the most plausible explanation of this experience. As a way of thinking certain experiences this no doubt has some validity, but the richness of the experience in question goes beyond explication in such straightforward terms. It is in the later work of Merleau-Ponty we discover the beginnings of a radicalised understanding of the spatial.

In *The Visible and the Invisible*, Merleau-Ponty moves towards the limits of phenomenology. As the study of appearances, the phenomenological investigation of the invisible seems compromised at the outset. However, Merleau-Ponty understands the invisible as the "latency of the world", and as such it is *implicated* in appearance. The text gives particular consideration to the issue of the seer and the seen, leading to the concept of the "Flesh" of the world, in which the seer is caught up in what is seen. But in questioning our notions of the seer and the seen we must first question our assumptions about the visible. Merleau-Ponty claims that the visible is

"... not a chunk of absolutely hard, indivisible being, offered all naked to a vision which could be only total or null, but is rather a sort of straits between exterior horizons and interior horizons ever gaping open, something that comes to touch lightly and makes diverse regions of the colour or visible world resound at the distances, a *certain differentiation*, an ephemeral modulation of this world - less a colour or a thing, therefore, than a difference between things and colours, a *momentary crystallisation of coloured being or of visibility*. Between the alleged colours and visibles we would find anew the tissue that lines them, sustains them, and which for its part is not a thing, but a possibility, a latency, and a flesh of things."²

The visible therefore, no longer remains in itself, identified within a lexicon of things, but comes into question as "a certain differentiation, an ephemeral modulation." This differentiation, opening upon the visible, is not the difference between the *already* visible things of the world, but an *original* and productive difference which explicates the visible. Due to Merleau-Ponty's death, this aspect of his thought is only hinted at, and we are left to make our own sense of it. Leaving their divergence aside, Gilles Deleuze affords us one means of developing this thought. In Deleuze's philosophy of difference in itself, he employs notions of differential calculus. In discussing its formulae he notes that

"The relation dy/dx is not like a fraction which is established between particular quanta in intuition, but neither is it a general relation between variable algebraic magnitudes or quantities. Each term exists *absolutely only in its relation to the other*: it is no longer necessary or even possible to indicate an independent variable."³

Thinking differentiation with Deleuze, we need to acknowledge the intertwining of the sentient and the sensible, the seeing and the seen. So that when Merleau-Ponty claims that "I must no longer think of myself in the world"⁴ there is a recognition of our indivisibility with, and *implication* in, the world and therefore a rupture of the traditional model of thinking subject and object. This also allows us to make an important distinction. Interaction, the influence of things upon each other, is realized as a condition of our being in the world. But it has been mistakenly applied to virtual worlds, as many who speak of interaction are in reality dealing with the issue of power; the power to transform a world.

But what is the nature of this invisible which lines the visible? It seems that our only option is to seek

this latency, this flesh of things via the visible. In his search for the invisible Merleau-Ponty identifies "the disclosure of a universe of ideas" that unlike those "of science, cannot be detached from the sensible appearances and be erected into a second positivity"⁵ These ideas which cannot be simply thought are

"... in transparency behind the sensible, or in its heart. Each time we want to get at it immediately, or lay hands on it, or circumscribe it, or see it unveiled, we do in fact feel that the attempt is misconceived, that it retreats in the measure that we approach. The explication does not give us the idea itself, it is but a second version of it, a more manageable derivative."⁶

The ideas therefore are not opposed to the real, but to the actual, for the ideas are real in themselves. It is not even possible to think back to the ideas from the actual, to multiply the actual to the possible, as this is antithetical to the reality of the ideas. The ungraspability of ideas occurs through their *explication*, the *differentiation* which gives us the "more manageable derivative." This world of the invisible, this universe of ideas, is one which not only arrests or evades thought, but must it seems, *remain* in its latency. This also occurs in Deleuze's philosophy, where he uses the term "idea" as the "differential of thought,"⁷ presenting ideas as multiplicities within a virtual state, which

"... must have neither sensible form nor conceptual signification, nor, therefore, any assignable function. They are not even actually existent, but inseparable from a potential or a virtuality. In this sense they imply no prior identity, no positing of a something that could be called the *one and the same*..."⁸

The very possibility of considering difference in itself must be divorced from identity. Identity relates difference to a point, to the one and the same, a *difference from*, an assimilation denying difference in itself. Deleuze also relates the ideas not to the Cogito but what he terms the "fractured I of a dissolved Cogito"⁹. Therefore the ideas have the quality of multiplicity, not only in relation to, but also of the self. But we must ask ourselves how can we know of a quality which retreats in our attempt to know it? Merleau-Ponty notes that "We do not see, do not hear the ideas, and not even with the mind's eye or with a third ear."¹⁰ If we cannot know the ideas through explicated identity, if the attempt to think this quality is flawed, then it may be within its *interruption* of consciousness that we know them. As Levinas's analysis of the Other reminds us, what is at stake is "... the calling of consciousness into question and not a consciousness of calling into question."¹¹ Merleau-Ponty goes so far as to state that "There is no longer consciousness, projections, in itself or object, there are fields in intersection". An intersection in which the invisible affects us without becoming the one and the same. Both Merleau-Ponty and Deleuze use the term Depth to describe this intersection, this dimension of appearances.

Deleuze states that "Depth is simultaneously the imperceptible and that which can only be perceived..." echoing his earlier formulation of the Idea. He identifies Depth as the *limit* of sensibility, as the undifferentiated, difference in itself, which tends to be cancelled because the explication covers it with a quality which alienates or contradicts it. However this difference is always implicated in actualisation.

"It is a transcendental illusion because it is entirely true that difference is cancelled qualitatively and in extension. It is nevertheless an illusion, since the nature of difference lies neither in the quality by which it is covered nor in the intensity by which it is explicated. Difference is intensive, *indistinguishable from depth in the form of a non-qualified spatium*, the matrix of the unequal and the different. Intensity is not the sensible but the being of the sensible, where different relates to different"¹²

Opening upon un-differentiated being, the interruption of consciousness signals a move from the understanding of expressive space as the "I can" of consciousness towards the sensible intensity of Depth, towards a non-qualified space at the limits of sensibility. Both thinkers posit Depth, not as a third dimension derived from the other two, a measured absence between things, but as a dimension in its own right from which the others are derived. But if one were to try and think Depth, to try and give essence to that which cannot have essence how might this be done? Merleau-Ponty attempts this in *Eye and Mind* through the consideration of the aesthetic.

"Also in the water colours of Cezanne's last years, for example, space... radiates around planes which cannot be assigned to any place at all: "a superimposing of transparent surfaces," a flowing movement of planes of colour which overlap, which advance and retreat."¹³

Through the rupturing of space as a measured absence, we realise relationships beyond a particular point of view, beyond dualism. Implicit within this is the overturning of consciousness and the rupturing of the Cogito. Merleau-Ponty claims this for Cezanne when he claims that he sought the "deflagration of Being"¹⁴.

Though Depth's spatiality is not attributable solely to space, we nevertheless might ask why it should be, if space is an explicated value derived from Depth. Deleuze talks of Depth which "... bears witness to the furthest past and to the coexistence of the past with the present"¹⁵ It is at this point that Levinas's analysis of the trace comes to mind where he identifies the trace as "... the insertion of

space in time, the point at which the world inclines toward a past and a time.¹⁶ and hence the interruption – spacing – of the temporal flow or unity of consciousness. This moment which is a non-moment and its relationship to the spatial underpins a cliché of film making. The moment when amidst the action there is a pause as we zoom in on a character. Not only do we experience the flexing of space, but the suspension of time, often emphasized by a dramatic return to the narrative.

The issue of time gives us another way to consider the interruption of consciousness that depth signifies. Our everyday lives are possessed of a thickness of time, allowing one to listen to music for instance, without which it would just be a series of successive tones. But the experience of music is such that we are able to experience these tones rather than recollect them. This is also found in reading or listening, we do not need to recollect a sentence to follow it, indeed the moment we do, we fail to listen. A number of analyses, neurological and philosophical have viewed this as a matter of feedback, the feedback providing the lived thickness of an event beyond its duration. However thinking time in such a way it is still a linear progression, the feedback merely the folding back that experience as the thickness of the flow. But what if we were to think of linear time, not as original, but as part and parcel of differentiation and the formation of identity? Then we need to seek not the difference between the experienced moments of the flow, but an *original* and productive difference which explicates the flow. Deleuze seems to point this notion out when he states that "Actualization takes place in three series: space, time, and also consciousness". However the feedback model allows further insights, since the explicated only covers over the implicated, this feedback would explain how we sometimes describe things as having resonance, as the invisible also resonates sensibly through the explicated order. Thus this resonance is the quality, which *cannot* be identified, but pervades a work. In making installation although having worked very much with the sensuality of materials, I have had to accept the fact that one is working with not so much with the materials but with the resonant qualities that they possess.

In conclusion it can be said that there has been a rush to force the analogy between the human and the digital, much in the way the mechanistic view was adopted after Newton. If the medium is the message, we have to avoid these analogies. A radicalized phenomenology of space of Depth, adequate to both material and digital worlds, departs from traditional models of consciousness and sensation, and relies upon the intertwining of the sensible and sentient, and as such the body is inseparable from such a consideration. The sensuality of the digital becomes a radical element in the consideration of this phenomenology. It is upon the very intangibility, the immateriality of the cybernetic space upon which its sensuality rests, and the remarkable nature of the digital starts to be realized. This immateriality can, and has, been made manifest in many ways, the increasing power of processors allows translucency in real time, but simpler means are available as anyone who has chased Fujihata's stone will realize. The fractured I that Deleuze identifies is another manifestation of this sensuality. But what is important is that we do not ask the digital to imitate a reality which subverts its own, but look to its own reality, which is between the material and the immaterial, which is of emergence.

1. *Essential McLuhan* p 159
2. Merleau-Ponty, *The Visible and the Invisible* p 132
3. Gilles Deleuze, *Difference and Repetition* p 172
4. Merleau-Ponty, *The Visible and the Invisible* p 227
5. *Ibid* p 149
6. *Ibid* p 150
7. Gilles Deleuze, *Difference and Repetition* p 194
8. *Ibid* p 183
9. *Ibid* p 194
10. Merleau-Ponty, *The Visible and the Invisible* p 151
11. Levinas, *Basic Philosophical Writings* p 54
12. Gilles Deleuze, *Difference and Repetition* p 266
13. Merleau-Ponty, *Eye and Mind* p 180
14. *Ibid*
15. *Ibid* p 230
16. Levinas, *Basic Philosophical Writings* p 62

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What Is Performance Multimedia?

And Why Is It Impossible To Record Performance Multimedia?

Performance multimedia is a live, in the moment, real-time experience for the performers and the audience; it defies the limits of recorded documentation. It is a large multidimensional theatrical event unlike the small personal-size desktop multimedia bundle found on a CD-ROM

A person in the audience at one of my performance multimedia events can choose to pay attention to any one of many elements happening simultaneously. They can look at the live musicians and/or dancers performing on the stage. They can watch me in the pit in front of the stage working with one or more of a collection of multimedia instruments including synthesizers, a laser animation system, computers, a video camera, a video genlock, video monitors, and an audio mixer. They can observe my small monitors and follow my decision-making process as I mix one of my precomposed video streams with my camera images of the live performers as they are digitized and processed by the computer. They can view the resultant mixed images on the large projection screen or any of the multiple large video monitors on each side of the projection screen. They can focus in on any one of those elements, view a number of them simultaneously, or alternate their focus and perspective at will.

Freedom to choose your own focus and perspective thereby creating your own personal experience of the event is an important aspect of witnessing a performance multimedia event. No recording medium can come close to recreating the richness and excitement of that personal experience. People often ask to see video recordings of my multimedia events. Video is simply not up to the task of capturing the fullness of performance multimedia. At best a video recording provides a small fixed window on a large multidimensional experience. The video window can move around the experience but it is always small and it is always fixed. A video tape's greatest liability is that it is canned. There is no freedom in watching a video tape; it's linear and it's fixed in focus, perspective, rhythm, and dimension.

In the laser segment of my multimedia shows the laser animation imagery fills the projection screen to overflowing. The 4:3 aspect ratio of video is completely out of character with the unbridled evolving forms of laser imagery. The lively sparkle of laser light pales on the video monitor. Laser animation simply doesn't translate to video tape.

Even if there were a perfect recording medium for my performance multimedia events, it would only demonstrate what that one particular recorded event was like. It would miss making the point that every performance is unique. Collaborating with local artists in local spaces means that every performance has a different setting and different musicians, dancers, visual artists, and theater artists; the direction of every event is consistent with my perspective, but each realization is unique.

My real-time video work is based on performance modules that I adjust in performance with local artists. Local artists select their own accompanying videos from an extensive collection of my precomposed video animations that have a broad expressive range. My music-based laser animations are also not absolutely fixed pieces; rather they are performances based on malleable modules that I've been sculpting and fine tuning since 1975.

It bears repeating: each performance multimedia event is unique to the sponsoring locale and far beyond the limits of any recording medium or combination of recording media.

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Computer Theater

*Computer Theater*¹ refers to live theatrical performances² involving active use of computers in the artistic process. The concept groups diverse ideas, methods, and levels of integration between theatrical and electronic elements.³

The use of computers in theater can be roughly subdivided in four categories. Computers can be used as *electronic puppets*⁴, where a human puppeteer controls a computer graphics character displayed on a stage screen. More novel is what I call a *computer-actor*,⁵ where the computer automatically controls a character, establishing a true interplay between man and machine. A third possibility is expanding the body of an actor on stage, enabling the actor to produce sound, images, or music as expansions of his voice and body — a *hyper-actor*.⁶ Finally, the most common example of the use of computers in theater has been *computerized stages*, where the space as an element of the performance (set, lights, and ambient music) is controlled by a computer.⁷

Recent developments in image processing and speech recognition now permit that basic aspects of

the live action performed on a stage to be recognized in real time by a computational system. Also, computer graphics and multimedia technology are achieving a state where live control of graphics and video on a stage screen is possible. These technological breakthroughs are opening the stage for artistic experiences involving computer-synthesized characters and environments that were virtually impossible less than half a decade ago.⁸

Although input/output possibilities have dramatically increased, a big piece is still missing from the picture: a language for communication between computers and actors, directors, and play-writers.⁹ While MIDI commands capture electronically the concept of musical notes, the action elements of theater have no established correspondence in the computer realm. Theatrical performances with computers have been quite less common due, in my view, to this lack of appropriate technology to deal with **action**, the structural element of theater.

My current work is focused on both to the development of solid foundations for computer theater technology and on the exploration of the artistic possibilities enabled by inserting electronics and computers into the world of theater and interactive art. This paper summarizes some of my views and research, and introduces two projects in computer theater produced in 1996 and 1997.¹⁰

Computer Technology for Theater

The relative ease of automatic translation of musical scores to a computational representation (MIDI, for example) seems to have played a major role in the development of computer music. Theater scripts capture many aspects of theater by describing the action and interaction among the characters but there is no method to translate characters' lines and stage directions written in natural language into something useful for a computer engaged in performance. On the other hand, the low-level descriptions of body and joint movements used in computer graphics are hardly the convenient way to describe the long, subtle, and delicate interaction among characters in a play.

Computer representations for **human action** have recently attracted the attention of the computer vision research community. Representation and recognition of human action constitutes the major component of my scientific research at the MIT Media Laboratory (advised by Prof. Aaron Bobick). The goal is to develop technology to represent to the computer both the individual actions and the interaction among human and computerized characters in a play or story-based interactive environments.

Representing Action and Interaction

Representing actions has been object of research of linguistics,¹¹ computer graphics,¹² and computer vision.¹³ However, the research is hindered by unsolved, difficult AI problems like representation and use of context, time, and common-sense.

At the MIT Media Laboratory, Aaron Bobick and I are developing a language for action representation, called *ActScript*,¹⁴ which uses a small number of primitive elements according to principles first proposed by Roger Schank [20]. The basic idea is to decompose an action into smaller component sub-actions and to codify the temporal constraints between them using elements from Allen's temporal algebra [1]. The goal is to have a language that enables the computer to represent most common actions without relying on a large and complex action dictionary. We employ Schank-like primitive actions – PROPEL, MOVE, INGEST, GRASP, EXPEL, PTRANS, ATRANS, PRODUCE, ATTEND, MTRANS, MBUILD – in tree-like structures representing concepts like physical change, transfer of ownership, goals, and conditional belief.

The existence of an explicit representation for actions allows the construction of computer systems able to reason symbolically about the behavior of the participants in the performance. A computer-actor, for example, can infer how to act towards a goal set by the story or play. Also, if multiple computer- and hyper-actors are engaged in the same performance, they can exchange information using *ActScript*. In such a situation, all the sub-systems "speak" a common, high-level language that can also be understood by human beings involved in the process (like it is possible to understand MIDI commands by referring to their musical meaning).

To describe stories and plays, it is necessary to represent not only action but also interaction. Theater plays involve sequential and parallel actions, coincidences, and the notions of development and climax. That involves complex temporal structures that most of current technology for interaction can not handle.¹⁵ For example, *event-based* game and multi-media engines are good when representing what happens when a determined condition is met, but they are clumsy describing events that are pre-requisites for other events, or mutually exclusive actions.

In work started at the ATR-MIC Research Laboratory with Kenji Mase and later Aaron Bobick [14], we developed a method for representing interaction based on the concept of time intervals. Each action is conceptually encapsulated in an interval, and the interaction is described by imposing temporal constraints among the action intervals. In this paradigm – called *interval scripts* – sequencing is achieved by telling the computer that an interval is immediately followed by another. Temporal constraints are also used to describe concepts like preemption, cause, and containment. Currently, Bobick and I have been incorporating some of the structures of event-based languages, like conditional execution and loops, into the interval script framework.

Two Projects

Beginning in the summer of 1996, I started to apply the technology described above in real theater projects. In the first one, *SingSong*, the primary intention was to experiment with the technological and aesthetic limitations of theater with computer-actors. The project currently in development, *It / I*, explores both the artistic and the technological directions by examining the relation between people and technology through the creation of an environment dominated by a truly computerized creature.

First Experiment: "SingSong"

SingSong is a short computer theater play produced in the summer of 1996, at the ATR Laboratories in Kyoto, Japan. The piece is a comical sketch portraying a clown trying to conduct a chorus of computer-controlled singers. The story is centered on gags between the clown and a troublemaker singer: initially, this singer complains when the maestro requests silence; later, it refuses to get in tune unless the conductor kneels down and pleads; and, after singing, during the applause, it rebels again [Fig. 1].



Figure 1

Two pieces of technology were fundamental in the development of *SingSong*. The computer vision program *pfinder*¹⁶ was employed to process the images taken from a camera and to extract the position of the hands and the head of the performer. In the closed context of *SingSong*, this tracking information could be safely translated into actions like pointing, a request to stop, and conducting. To represent the interaction between the virtual and real characters, the paradigm of *interval scripts* mentioned before was developed and implemented, making possible easy story-dependent specification of character behavior.

A Computer Pantomime: "It / I"

It / I is a computer pantomime for a human and a computer actor about living in a world increasingly populated by technology. In this allegory of the contemporary world, freely inspired by Samuel Beckett's "Act Without Words I", "Waiting for Godot", and "Ghost Trio", a human character, "I", inhabits a space dominated by an omnipresent computer creature, "It". "It" is never actually seen, but its existence is felt through virtual objects projected on two large stage screens. By manipulating the human character's desire of information and entertainment, "It" leads "I" into a perpetual cycle of despair, resignation, and death.

It / I employs state-of-the-art computer vision technology able to track the actor and props in spite of lighting changes and rear-projection screens.¹⁷ The different modules that control the physical devices, the characters, and the play communicate among themselves using *ActScript*. We use an improved version of interval scripts to describe and control both the characters' behavior and the overall structure of the play, enabling flexible rehearsal and greater interactivity between human and computer actors. The concepts of actions, conditional events, and negative constraints between characters are fully implemented and used in *It / I*.

Another new aspect of *It / I* is audience interaction with the computer character. As part of the play, members of the public are invited to join the performance and inhabit temporarily "I's" little world. The computer character automatically controls the performance while the non-actor is on stage, leading him/her to experiences similar to those lived by "I." After the actor's performance, the public is invited again to the stage, this time to a more private experience of living in the universe controlled by "It".

Making Theater with Computers

The concept of action is essential to the vitality of theatrical performance and must be incorporated, implicitly or explicitly, into any computer theater system. I do not foresee widespread use of comput-

ers in theater until a language paradigm is established which is expressive enough for computer manipulation, and simple enough to be used by performers, directors, and play-writers.

Bringing computers to theatrical performances has the potential to move theater into new directions. With computer- and hyper-actors the stage is open to characters that are legitimate representatives of the electronic realm that surrounds us, although computer theater certainly goes beyond the representation of its own electronic substrate. Computers can create new characters and bodies to be explored creatively by play-writers and directors as much as computers have expanded the frontiers of the musical experience.

However, I am particularly fascinated by the possibility of using computerized environments and characters to make plays where a member of the audience is able to experience the feeling of living a character in the play. This excitement drives me towards the development of autonomous computer-actors and stages that are able to both integrate performers and audience and also control an interactive re-enacting of the play with non-actors playing the main characters.

Computerized characters and plays is a personal path to explore the frontier between real and virtual worlds that is increasingly blurred by technology. *SingSong* and *It / I* are simple, first experiments about designing, scripting, rehearsing, and performing with characters – and “actors” – which are born virtual, truly inhabit a non-physical world, interact with human performers, and tragically disappear with the click of a switch.

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1. The term "computer theater" has been previously used to describe adventure games with complex stories (see [2]). One of the reasons for reshaping the term computer theater as described in the text is to highlight the similarities with computer music and the development of inter-relations between music and computers in the last three decades (for current perspectives, see [19]).
 2. Using here Schechner's definition of performance as "... an activity done by an individual or a group (performers) in the presence of and for another individual or group (audience)." [21].
 3. It is not the goal of this paper to review the work done in computer theater. The works referenced here were selected solely to illustrate different approaches. A larger compilation of references is available at <http://www.media.mit.edu/~pinhanez/ctrefs/ctrefs.html>.
 4. Examples of use of electronic puppets are more common in the context of performance animation. See Protozoa's work (<http://protozoa.protozoa.com/>) and RiGBY, which appears in performances by D'Cuckoo (<http://www.duckoo.com/>).
 5. For example, the creatures designed by Naoko Tosa [24], Bruce Blumberg [12], and Joseph Bates [3].
 6. For example, the works of George Coates (<http://www.georgecoates.org/>), Troika Ranch (http://www.art.net/Studios/Performance/Dance/Troika_Ranch/TroikaHome.html), Mark Reaney [18]. The term hyper-actor is suggested as an analogy with Tod Machover's hyperinstruments [11].
 7. A typical example is Robb Lovell's "Intelligent Stage" [10].
 8. Some examples are Tod Machover's Brain Opera (<http://brainop.media.mit.edu/>), and Gloriana Davenport and Larry Friedlander's Wheel of Life [4].
 9. A similar situation is faced by dancers and choreographers who, notwithstanding being more active in exploring the new technologies, also lack a language to describe body movement and shape to electronic partners.
 10. For a more detailed paper on the technological aspects of the research, see [16].
 11. Examples are the works of Jackendoff [7], Schank [20], and Pinker [17].
 12. See Kalita [8].
 13. See Siskind [22].
 14. ActScript is a development of a paradigm previously developed called action frames (see [15]).
 15. Interesting exceptions are the works of Galyean [5] and Strassman [23].
 16. See [25].
 17. Using three cameras in a fast triangulation system [6].

Liminality: Place and Non-Place in Fine Art

Location and Place

Distinctions between location and place can be illustrated by the difference between the terms house and home. House is mapped using co-ordinate points or postal addresses. Home, although alluding to house, is both a perception and recollection. A location is a position. Place, on the other hand, is a more elusive term, because it is derived from lived experience and personal introspection. Place is the product of our memories and our fantasies.

The following text and images are taken from *Rumours are Always Time* written by Tim Etchells and performed by Forced Entertainment.

All this used to be a desert, and before that it was mud. This is where the shoot out started, and this is where the lovers fell in love, and this is where the barricades were. This is where they found the children, and this is where the bridge collapsed, and this is where the birds flocked, and this is where the alarm was raised. And isn't this the place where you walked each evening?

This text reveals location to be a fixed spatial reference, acting as both a setting and context for interaction. Location may help better define place, but a sense of place is difficult to ascertain, as is shown by the text's final contrasting question.

Place and Time

Place, derived from the memories we associate with a location, is therefore a mental map that we construct and reconstruct over time. Parkes and Thrift (1980, p. 138) distinguish between location and place and their relationship to time.

Location is determined outside the individual. Place is constructed from inside the individual, as mental maps and personalized images of time.

The geographer Tuan (1977, p. 136) states that "Location is transformed into place as it acquires definition and meaning." The longer we reside at a location the more events we associate with it, the more we feel its particular qualities. The longer we pause, the further we transform location into place.

Place is therefore strengthened by repetition and reoccurrence. Graham Gussin's installation *The Fall* presents a video projection of a landscape alluding to a picture postcard. The image appears to be static. However, intermittent and random explosions in the lake continually disrupt the image. The explosions are caused by a random loop written into a computer programme which controls the work. Chance and unique explosions are mapped onto a concrete location. The artist's decision not to document the explosive events emphasises the distinction between location and place. Location is concrete and place is as transient and ever-changing as Gussin's random explosions.

The temporal and changeable character of place has been termed in various ways: N-dimensional, a paraspace, and more recently space-time. Location can be defined and represented within three dimensional space whereas place comprises and requires a definition of more than three dimensional space.

Place and Identity

Self is essential to a definition of place. Heidegger (1959) believes place to be the *unique dwelling of being*. The unique dwelling of being, the self, is the first stage of place construction. As individuals, we additionally subscribe to shared identities and external constructions of place because they reinforce and protect our self identification and internal place construction.

Mark Wallinger's ironic photographic work is entitled *Mark Wallinger, 31 Hayes Court, Camberwell New Road, Camberwell, London, England, Great Britain, Europe, The World, The Solar System, The Galaxy, The Universe*. The title literally addresses the need in individuals to locate themselves geographically. The photograph depicts a place, identifying an individual's need to locate him or herself within a culture, to be a part of a group (in this instance the crowd), and the crowd requiring a greater national identity. Wallinger's work conveys how self and group identities become accentuated when individuals feel their personal memories of place to be threatened.

Mark Wallinger's photograph also suggests the potential conflict between rival groups sharing the same location but holding contradictory place loyalties. The reinforcement of group identities often involves an attempt to control, distort, or limit the place of others. A group protects itself against external threats to ensure that its identity is maintained (Auge, 1995). We retreat into believing that place is fixed. In fact it is location that is fixed (Massey, 1994).

Technique

Place is a deep-rooted and fundamental necessity to personal identity. A sense of place can be successfully manipulated to influence and control people, with the effects of place on our behaviour and conduct for us in advance (Relph, 1976). *Technique* involves the designing of experiences

and therefore the predetermination of a response. Recognition of place allows us an automatic response to the stimulus presented: we know what to do. (Umberto Eco, 1967)

The reproduction of places allows for quick recognition. We instantly recognize where we are, for example, when we pay a visit to a McDonald's fast food outlet. We can see recognizable places occurring more and more often in the homogenization of the high street. Here, technique gives consistency to a trademark.

The artist Guillaume Bijl builds temporary installations in galleries. He installs, for example, fully functioning shops as art works in a gallery space. His work addresses the ease in which a sense of place can be constructed. In these installations we can observe how a particular place affects people's behaviour, be it a gallery, and a men's clothing shop or a psychiatric hospital. As with Wallinger's work, individuals rely on place for stable self identities.

Non-Place

Place is, as established earlier, distinct from location. Place is revealed through memory, identity, and space-time. By contrast, non-places do not negate place, but often retain many qualities that can be ascribed to that of place, with their own characteristics, events, and social relations. And yet they sit aside from place as counter-sites or deviations (Foucault, 1986).

Non-place has an affiliation to space and time which parallels that of place. Through this similarity and often close proximity to place, they, in the words of Newman (1994, p.86) cause the *displacement and destruction of places*. ... they are, unlike space, but on the same level. There are various types of non-places that proliferate the contemporary environment.

Terrain – Vague

Terrain – Vague is a French term used to describe the disregarded edge between distinct locations (Grathwol, 1992). It is a non-place that occurs unconsciously, an unclaimed location, excluded from development and separated from its previous natural state. As is illustrated in the photographic works of Grethe Grathwol, *terrain-vague* is a non-place that defies inhabitation, a common non-place in many cities and suburbs (Bloomer and Moore, 1977).

This second photographic piece by Grathwol emphasises the detachment of *terrain-vague* from place. The advertising hoardings face away from the disregarded wasteland. Other non-places prevail in the contemporary environment and involve the physical dislocation and displacement of people. They are transient, the non-place in an expanding *travelling culture* (Clifford, 1992). The term travelling culture does not refer in this context to nomadic cultures but that of the passenger or tourist. Nomadic cultures maintain history and identity within mobility, and the perpetuation of mobility reaffirms nomadic status. Conversely, travelling culture results from innovations in the technology of mobility. The status of the subject within the travelling culture is often a-historical, a-cultural, and concerned with non-identity. Within the travelling culture we experience temporary non-places. The relationship between a location and, for example, a vehicle is often ad hoc, casual and unmediated. Vehicles can relocate. Planes and boats are the most dynamic vehicles within temporary non-places because they are unconnected and unrestricted by the fixed location of a passage.

Other modes of non-place are restricted in their passage: the motorway for the car, the track for the train. These are also termed static vehicles because they do not move, yet they enable us to move (Virilio, 1991). A passage in a travelling culture sits between identified locations. The motorway, the corridor, and passport control are all passages and states of transition between recognised locations. Julian Opies painted screen saver entitled "Imagine you are driving (?)" depicts the road ahead, with the passage presented as subordinate to the destination.

Liminality

The anthropologist Van Gennep (1960) focuses on rites of passage as the transition between important cultural intervals, such as the interval between childhood and manhood. The passage between these statuses is described as liminal, or non-place. Liminality takes up definition as an entity in its own right, a counter-site or deviation, aside from place.

Mike Bode's *Corridor* represents a liminal state, which in this instance is a hospital passage. From the exterior we view *Corridor* as an entity in itself. The exits are located at each end of the furnished institutional static vehicle. With the doors closed *Corridor* becomes a passage between.

During the transitional stages of liminality, the subject's status is ambiguous and may determine or be determined by the non-place in which he or she resides. Liminality is defined by its non-specific or inverted characteristics. It is this ambiguity that defines a rite of passage. Victor Turner (1969, p.94) describes the status of the subject in a liminality stage as a passenger because they are neither here nor there; betwixt and between. He writes that the passenger *elude[s] or slip[s] through the network of classifications that normally locate states and positions in cultural space*.

Ed Ruscha's painting of a petrol station is titled *Standard Station*. Although petrol stations are important locations within the travelling culture, they are also unstimulating, routine and impersonal. Petrol stations elude all the qualities of place, as Ruscha's title suggests.

A dictionary definition of liminality is the limit below which a *given stimulus ceases to be perceptible*. Liminal or non-places are often designed to ease the passenger into a state of detachment. Self identification becomes replaced with a number plate, a ticket, a digit. Within the travelling culture the aim is to unburden the passenger or the tourist.

A precondition of non-place within the travelling culture is the non-identification and non-recognition that occurs within it. Augé (1995, p.78) writes on the detachment of the self in non-place.

If a place can be defined as relational, historical and concerned with identity, then a space which cannot be defined as relational, historical and concerned with identity will be a non-place.

Reverse Technique

Technique previously referred to as the pre-designing of locations to influence our recognition and recall, is applied to liminality in reverse. Reverse technique is used to numb our sense of non-place and our ambiguous position within it. This absence of sensation is confused with a sense of comfort.

In addition, developments in technology allow us accelerated movement within liminal or non-places. Yet the same technology's mask the speed at which we are travelling. Reverse technique is therefore embedded in these technologies (White, 1996).

La DS by the Brazilian artist Gabriel Orozco focuses on technology's attempts to reduce the time spent in liminal space. In this instance, the famous Citroën car has been subtly reduced in width, a streamlined form implying potentially greater acceleration and speed.

This is a still from my installation piece, *Drive-In*. Parked model cars watch a video projection of driving. A moving image is speeded up and framed within the front windscreen of a car.

Driving Movie sits adjacent to *Drive-In*. The static model taxi houses a small projector. We view a navigating taxi driver and passenger. The work is motionless but also in a state of transit. These are absurd images. The model cars are reduced to passengers. The road comes to them, compressing perceptions of space and time, and manipulating our perception of non-place (Harvey, 1989).

These works attempt to draw parallels between the passage, the road ahead, and the passage, the computer terminal. Liminality within the travelling culture is extended by digital technology when we visit locations on the internet. The works also address the paradox of non-locations on the world wide web. Reverse technique is embedded in the advancements of digital technology which attempt to reduce the interval of download time. It is ambiguous as to whether the goal of technological innovation to create simultaneous departure and arrival has been successful.

Developments in technology mean that we spend growing amounts of time in interval or liminal periods, 'dwelling' in the non-place of travel. Contemporary artists are increasingly negotiating combinations of stasis and motion, a paradox arising out of disrupted conceptions of location, place and identity. Technological innovations have initiated a collapsing of the perceived boundaries between space and time. And both trends are now accelerated by digital technology.

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Interactivity, Public Art, and Architecture

"There seems to be a parallel between the emergence of the archeological art and some changes taking place in the cultural and intellectual ambience. The general framework seems to be the gradual displacement of the 1980's "postmodernist" discourse in favour of an approach which once again seeks foothold in "real" space and time."

Erkki Huhtamo¹

Introduction

I was struck by how many of the ISEA presentations, not simply those in this session, mention the words "architecture" or "city". As Erkki Huhtamo points out in the above quote, this seems to be an expression of a general desire for an art that is in part tangible, physical and social in nature and intent. When he talks of archeological art he appears to mean an art referencing and recycling earlier technological histories. An art that attempts to gain critical purchase through a tension between its electronic space and its physical and mechanical one.

Thus while I intend to concentrate on examples of haptic or physically responsive interactive art in public spaces and installed architectural contexts - that is "real" space and time, I recognise here a fascinating problem of definitions. For "public" space in the late twentieth century also means the infinitely expanding region of cyberspace. While agreeing with Paul Virilio's term for this bifurcation of our realities through the "accident" or advent of virtual technologies; I do not agree that they have an equal validity. Our historical definition of those that did was "Saints and Madmen".

The question of virtual worlds and architectures of the net will be later addressed, since the same syntax and grammar of experience applies to both aspects these of digital art in the "public" domain.

What Virilio also makes clear is that the new technologies are progressively diminishing and even finally eliminating a fundamental condition of human perception — spatial distance, the distance between subject and the object. In this reading "distance" is a positive quality of vital importance to the development of meaningful art.²

Philosophies

If we track recent philosophical debates, perhaps we can explain the renewed interest in strongly physical presence and digital interaction. While the philosophical discourse which developed during the growth of the image-based society of the 1970s and 1980s has moved on from the simplistic McLuhanite notions of a "global village" linked by the media; through the literary semiotics of Jacques Derrida (which argued that any given text can only refer to other texts, so that only the signifier remains, the signified, afferent world having been lost in the universal background noise of the "already written") on to Jean Baudrillard who applied the same critique to the world of audiovisual media. Following from Benjamin, for Baudrillard the "aura" of authenticity is lost forever in a world of media simulation, defined as a creation of the "Hyper-real" which has no material origin or reality. In media culture the ground of truth is lost and all that remains is a universe of self-referring "simulacra of simulations" which render decidability impossible. To Baudrillard this is the last throw of corporate capitalism, where instead of the territory preceding the map, the map of media simulation engenders the territory of consumer culture.

Other French philosophers have identified the anarchistic potential of the same process of simulation. Gilles Deleuze, in a postmodern reading of Nietzsche, inverts Baudrillard's definition of simulacra as perverse deceptions and false images. To Deleuze the simulacrum circumvents authority by including the spectator and the spectator's viewpoint as the sustaining necessity of the illusion. The simulacrum should not be thought of as a degraded copy, but as a positive force with the power to subvert the world of representation, by transcending the idea of original and copy and so denying the privileging of particular viewpoints. As I hope to show, this is precisely reflected by emerging trends in new genre public art that uses digital technology for "subversion" as an artistic strategy. Krzysztof Wodiczko's urban projections are a perfect example of this approach.

For Paul Virilio an evolutionary "accident" has occurred and the universe is henceforth split into two competing, but equal realities: the virtual resulting from an accident of the "real", asserting that a "substitution", rather than a "simulation", has occurred.³ This implies that we can choose to live and breathe in cyberspace: while some artists such as Stelarc have literally tried to wire themselves in physically, the artists in this discourse are living with and examining the contradictions embodied in this "substitution" of realities.

In the 1990s the question for artists has become not the authenticity of the image and its relationship to a set "reality"; but who controls the generation of simulations or substitutions and their contexts of their presentation. New practice in public art is intent on exploring these issues of control creatively. The gap between non-digital practice and technological art is finally closing after many years in which form supplanted content.

Origins

Consistent themes and uses for electronic art in public contexts were established early in the century and threads of similar practice may be traced through from Dada, Futurism and Constructivism and the Bauhaus to the present day. After all Tatlin was playing with motorized architecture in his monument to the Third International in 1920. The distant relationship between artist and architect has also created problems in the integration of public art, let alone digital art into public spaces. It is no accident that some of the more successful examples of actual or potential public art works using new technology have been produced by architecturally trained artists, most notably Shaw, Moller, and Diller & Scofidio. Because of the paucity of such examples, I won't apologize for addressing the potential found in several gallery works which could equally well serve in a public context.

In researching the origins of interactive work of this nature I was profoundly embarrassed to discover a common tendency (including my own) to repeat the experiments achieved nearly 70 years ago. Naum Gabo's *vibrating column k* was built in the immediate aftermath of the Russian revolution. It prefigures the work of kinetic artists like Wen Ying Tsai by over 30 years, as of course do Moholy Nagy's telephone paintings which again anticipating transmitted and telematic works from the 60s onward:

"Now the production of works of art is so facilitated and simplified that nobody can do better than order his works by telephone from his bed"⁴

Wen Ying Tsai incorporated audience reaction in the movement of their work, clapping and other sounds would cause vibrating rods and lights to alter their tempos, others had much larger ambitions.

Worse still, much of the technology evident today in public installation works is largely unchanged since the mid-60s! So much of what we think of as innovative was explored in some way during that period. EAT – *Experiments in Art and Technology* was founded in 1966. By 1969 it boasted a worldwide membership of 3000 artists and 3000 engineers. Robert Rauschenberg and Billy Kluver were prime movers. It was the first large scale attempt at matching technology and art and was highly adept at fundraising and industrial collaboration.

Rauschenberg and the group staged a series of large-scale public events and installations called 9 evenings. The most notable was "Open Score" at the NY Armory in 1966. A Tennis match with rackets containing tiny fm transmitters ensured that each time a ball was hit a light would extinguish to an amplified sound; eventually the match ended in total darkness. 500 volunteers then entered the court and went through a number of behaviours in darkness while their cctv infra red images were the only thing the audience could see on huge projection screens—a form of "darkness visible."

In "Soundings," a collaboration with Bell Labs, Rauschenberg installed sound sensors to control a lighting rig. Audience talk controlled the light falling on the huge multiple mirrored plexiglass panels silkscreened with images of wooden chairs so the chairs appeared to move randomly. While breaking ground in the development of public installations, the inconclusive nature of these experimental pieces was only partly due to immature technology, their rather vague grasping after metaphor and meaning suggests that Rauschenberg simply ran out of steam after solving the technical problems.

EAT's seduction by technology was to culminate in the Expo 70 Pavilion in Osaka. Sponsored by Pepsi, it was an attempt to create a "living, responsive environment," a non-hierarchical theatre space. It was a reprogrammable space with a giant "mirror room" full of interactive sound areas, a giant fog sculpture and motorised exterior sculptural elements or "floats" by Robert Breer. Innovative work was done with individual wireless hand sets and programmed laser displays. Visitors were responsible for their own experiences. The world of "Fluxus" and the "Happening" governed what was little more artistically than "son et lumiere."

Contrasts

If we compare this kinetic architecture with public art such as the Monument against Fascism by Jochen and Esther Gerz, we can see how far notions of appropriate content have moved in two decades. Installed in Hamburg in 1986 in the form of a Lead column 30 feet tall, the public were invited to incise it in response to a text pledging personal political responsibility. It soon became a graffiti board, sinking into the ground on hydraulic ram as the texts filled it. It refused to be the normal kind of authoritative symbol, but instead acted as repository for all the pain and contradiction of Germany past and present. The column is now fully hidden. While employing little in the way of new technology, it remains a seminal work of public interaction. All the more powerful as a metaphor for the buried tensions around racism and the Holocaust still prevalent in today's Germany.

Another early monumentally large public installation exhibiting the same techno-enthusiasms as *Pavilion* was Michael Hayden's *Arc en Ciel* 1978, consisting of many-hooped fluorescent tubes arching above the platforms of the Yorkdale subway station in Toronto. The piece measured 570 feet in length and was responsive to infra-red radiation. The arrival or departure of a train caused the piece to ripple with sweeps of multicoloured light following the passage of the warm subway train. 20000 effects were programmed on a cycle of 40 hours. The sensors could even respond to the movements of individuals on the platforms. The contrast with Diller and Scofidio's 1995 intimate text work at the Lexington Avenue subway could also not be greater.

One of the most successful works of computer art of the late sixties and early seventies in terms of a fully realised interactive installation was produced by Edward Ichnatowicz. The giant public piece which performed a seminal role in the realisation of what was artistically possible with computing and robotics was the *Senster*.⁶ It was an active metaphor playing on an audience's techno-fear and its simultaneous ability to control the products of nightmare remotely. Installed at the Phillips' industrial exhibition Evoluon at Eindhoven in 1971, it represented an extremely ambitious technical and artistic feat. About fifteen feet long and 8 feet high, the *Senster* consisted of six independent electro-hydraulic servo systems based on the articulation of a lobster's claw, allowing six degrees of freedom. The *Senster* had a "head" with four sensitive microphones which enabled the direction of the sound to be computed and also a close range radar device which detected movement. The whole was controlled in real-time by a digital computer which sent feedback from the movement and sounds of visitors to the Evoluon, so that the servos could reposition the head anywhere within 1,000 cubic feet within a couple of seconds.

Using a predictor, the programme put the machine through a complex series of accelerations and decelerations for the maximum efficiency of motion. The net result was convincingly lifelike in its movements and would shy away from loud noises. Unlike the automata of earlier ages the *Senster* didn't try to conceal its inner workings, never the less the public's response was to treat it as if it were a wild animal. The *Senster*, which works on so many levels of meaning and has never been surpassed in a robotic piece.

At the same time these early and grandiloquent projects were being thrust into the public eye Myron Kreuger⁷ was patiently mapping the territory by developing a language of interaction. Since 1974 his efforts have been focused on the development of "Videoplace," An attempt to create a wire-free projection environment capable of responding to each participant differently with over 12 interactive routines. The most famous of these was the "critter"—a small circular figure which avoids contact with a projected image of the participant. Kreuger's outstanding achievement lay in the foresight he showed in examining possible types of interaction, many of which inform both telematic and installation practice today. Interacting recently at an exhibition in Duisberg with a reconfigured version of this piece, I was struck by the play space, capable of reducing adults to their 5-year-old selves.

Contemporary Work

This sense of play, curiosity and inventiveness is reminiscent too of the fairground attraction and in many ways his approach mirrored that of Toshio Iwai whose entire oeuvre including his public art is based on play. In *Another Time, Another Space* created in Antwerp central station in 1993. Toshio Iwai made an electronic hall of mirrors using a tree structure of video screens. The installation featured 15 video cameras, 30 computers, 30 video monitors, and a videodisk recorder. The comings and goings of people through the station were filmed by the cameras, and manipulated in real-time by the computer to deform shape, time reference, and showing a different time-space environment in each movement. Video processing software reflected back crowds like fields of wheat where algorithms interpreted successive layers of crowd as wave-like motions. Sober-suited business men leapt and cavorted in front of these magic mirrors.

"I used the *Another Time, Another Space* system to create an experimental event as part of an NHK television program. People passing in front of Shinjuku Station were photographed by a video camera, and the images were altered and projected onto the giant Alta Vision screen across the street. It caused a much larger commotion than we expected. The moment the image appeared on the screen, hundreds of people started gathering in front of the station and waving their hands and moving their bodies as they watched their images on the screen. In that moment the big screen that everyone had been taking for granted suddenly became a giant interactive event."⁸

Jim Campell is known for his installations playing with discontinuities of time and space. He too was trained not as an artist, but as an engineer. His giant installation in Arizona in the early 1990s installed in the lobby of a stadium, resembles Iwai's, with columns made of video screens, cascading images like waterfalls, and frame grabs of passers-by, integrated and distorted in layers.

In Bristol as part of the *Imag@nation* project (a million pound series of commissions and festivals of interactive art), the photographer Tim McMillan proposes to install his unique simultaneous cameras in a shopping mall to freeze a subject's movement and play it back as a QuickTime VR film journey around their body, projected on a giant screen for public consumption.

Haptic Interfaces

This brings me to the principle subject of this paper, the nature of physical interaction in public art. Intimacy or crowd collaboration are both legitimate modes for the experience of public art. While Jeffrey Shaw is not an example of a public artist he is a wonderful source of examples of appropriate physical interfacing to works which could easily be placed in public contexts. Perhaps because of his background in architecture Shaw has always included strong physical elements for interaction in all his works. He defined the relationship between responsive architecture and its history at ISEA 1994:

"Responsive soft architecture in the 60s
Kinetic luminous sculpture in the 70s
Virtual architecture in the 80s
Televirtual architecture in the 90s"

His famous piece, *The Legible City 1989* – 9, combines a highly physical interface with virtual reality. The City is a computer-controlled and projected virtual urban landscape made up of solid three-dimensional letters that form words and sentences, instead of buildings, along the sides of the streets. The architecture of text replaces exactly the positions of buildings in a plan of the real cities (New York and Amsterdam). This spatial transformation of narrative is literal in every sense.

Bicycling through this city of words is a journey of reading, choosing a direction is a choice of text and meaning. The image of the city is projected on a large video screen in front of the bicycle, which is fixed like an exercise-bike.

His *Revolution 1990* was an interactive videodisk installation which allowed the user to turn the mill of history, tracing 200 years of turbulent history from 1789 to 1989. The considerable physical effort required to turn the installation is enough on its own to give "gravitas" to the content, demonstrating a perfect synchronization of metaphor and interface.¹⁰

While Shaw's works required a single user, another experimental interface which prefigures multi-participatory public works was created at the Banff Centre in Canada by Perry Hoberman. *Bar Code Hotel*¹¹ is an interactive environment for multiple participants. An entire room is covered with printed bar code symbols, an installation was created in which every surface can become a responsive object, making up an immersive interface that can be used simultaneously by a number of people to control and respond to a projected real-time computer-generated three-dimensional world.

Each "guest", who checks into the Bar Code Hotel is given a bar code wand. Because each wand can be distinguished by the system as a separate input device, each guest could have their own consistent identity and personality in the computer-generated world. And since the interface was the room itself, guests could interact not only with the computer-generated world, but with each other as well. The objects in Bar Code Hotel were based on a variety of familiar and inanimate things from everyday experience: eyeglasses, hats, suitcases, paperclips, boots, and so on.

The projected environment consisted of a number of computer-generated objects brought into being by scanning unique bar codes that are printed on white cubes that are dispersed throughout the room. Objects existed as semi-autonomous agents that were only partially under the control of their human collaborators. They also responded to other objects, and to their environment. They emitted a variety of sounds in the course of their actions and interactions. They had their own behavior and personality and life span.

Apparently objects could interact with each other in a variety of ways, ranging from "friendly to deviant to downright nasty."¹² They could form and break alliances. Together they made up an anarchic but functioning ecosystem. Thus the co-dependence of our two universes was established through the simplest piece of supermarket technology.

The largest scale experiment in public interaction in virtual spaces was the BBC's *Mirror*¹³ project, which used the net and vrml to create various user spaces with representation by simple geometric avatars. The physical interfacing was trivial by comparison with Davies's work and suggests a very wide gap between participatory VR in the gallery and in larger public contexts.

Brenda Laurel's work at Banff fused improvised theatre with the cutting edge of VR simulation, combining sensor feedback for arms and torso as well as hands and head. The participants could also alter their voices electronically to match the mythic characters whose identity they assume, and can swim or fly through the recorded video landscape mapped onto a computer 3-D model. The technology involved was immensely costly and temporarily patched together. The graphic difficulties Laurel describes suggest that such work will have to wait a while for public installation.¹⁵

In 1995, through the direct physical control of breathing, Char Davies's *Osmose*¹⁶ allowed the participant to explore a poetic virtual universe. The user sinks like a diver into a virtual and seemingly organic landscape as their breathing slows. Because of the unusual interface many participants found it parallel to near death experiences, particularly as the virtual world throws you out at the end of your timeslot, by shrinking to a bubble in infinite space.

Sommerer and Minnion have consistently worked with artificial life environments, often controlled through highly physical interfacing. From their interactive *Plant Growing 1993* where virtual plants grew by the electrostatic reaction of plants to human touch, through to the water-covered interface of *A-Volve* in 1994. A survival of the fittest virtual aquarium where creatures created by the audience struggle to swim, eat and die. Audience attention through touch prolongs the life of the creatures. The advent of a biological interface between real and virtual space had arrived.

Telematics and the collapse of distance

While Virilio implies a certain unease with the collapse of "distance", the physical telescoping of experiential distance is greeted with wonder and utopian enthusiasm by many artists. The confounding of immediate presence and art is a questionable mental manoeuvre, if the context and content do little more than embarrass or confound the public. Galloway and Rabinowitz¹⁷ created *Hole in Space* in 1980, using a direct video link installed between LA and NY streets allowing direct dialogue between public in the two locations. It is debateable whether this was early teleconferencing or art.

In a lighter frame, Paul Sermon's experiments with telepresence in *Telematic Dreaming 1992*, an interactive bed where through an aligned projection of a similar bed two people displaced by distance could indulge in interactive foreplay with each other's video ghost. The variety of human behaviours is endlessly fascinating to audiences, but the art remains close to a 60s "Happening."

My *Memory Wall* proposal uses physical telemetry depending on a two way array of wired hydraulic rods, like a vastly expanded executive toy. Bas relief projections would be transmitted between two public venues, as the audiences literally embed themselves in the wall.

Architecture

If we look next at the possible fusion of physical architecture and public art works, we see another discrepancy. Materials technology in the 1990s is beginning to deliver the means for artist-architect collaborations which might finally realise some of the 1960s dreams of adaptive or "liquid" architecture. Dreams of groups like Cedric Price's *Archigram* and later visionaries like John Fraser.¹⁸ The development of electro-heliological fluids which transform from liquid to solid state at the passing of a current, piezo-electrical ceramic which can change colour to order, SMA-shape memory alloys which act like muscles and liquid crystal glass, paint and inks that respond to tiny electrical or temperature changes allow a building or artwork to behave in a biological manner. New research in nanotechnology combined with artificial life programming implies self repairing and "living" systems grown around human needs.

Even at the basic level of combining existing architectural materials with digital artwork, very little has been achieved, although the techniques are already in place. My researches into large scale digital murals in ceramic are only one example.¹⁹ The work of *Art of Change* in London's East end is also worthy of note.²⁰ Public art tends still to rely on the same electromechanical mechanisms developed 30 years ago by EAT. The use of digital signage and billboards for public art in the late 80s early 90s is well documented, and often proved a powerful tool in the hands of an artist as accomplished as Jenny Holtzer.²¹ However, more permanent integration of such work in public contexts remains elusive. An exception to this curious reluctance to engage with new materials is Christian Moller.²² His pioneering work points the way, with buildings such as the *ZeitGalerie* in Frankfurt (1992) which changes colour at night according to wind direction and speed, while a sine wave of light ripples its length governed by ambient noise from the street. People gather at night to clap and create sounds that alter the wave. How seriously one should take such interaction as art is another question.

Moller's more thoughtful gallery piece *Electronic Mirror* confounds our narcissism with a distance sensor and electroresponsive LC glass, clouding-over our image on close approach so we are literally swallowed by the glass like digital prisoners-shadowing the original myth.

In *Space Balance* (Ars Electronica 1992) a virtual interior architecture mirrors the hydraulic tipping of the viewing platform. The participants can roll virtual balls which click as they collide by the movement of their bodyweight on the platform. A similar device was used in *The Virtual Cage* in Frankfurt in 1993. The viewer dances on the platform in relation to a virtual swarm that interacts with the viewer's movements. This use of a tilting floor is currently being developed by Grahame Weinbren as a way of allowing audience participation in his interactive films and by Miroslaw Rogala in his 1994 ZKM installation *Lover's Leap*. Rogala's *Free Speech* installation here in Chicago's Bug House Square is described in detail elsewhere, and it too allows multiple user interactions in a defined space through infrared motion sensing.

New Initiatives

In Bristol a number of new initiatives are changing the climate on artist-architect collaboration. The Multi-million pound Harbourside development promises to incorporate the latest technologies in artist-architect collaborations. This unique scheme offers unprecedented opportunities because of the large public spaces and the nature of the building development. A state-of-the-art hands-on science centre with a vast changing LC wall, an imaginative centre for the performing arts, and an electronic zoo, where live habitats are telematically projected in real time, frame and contextualise the public spaces. My current collaboration with the Inscape architecture group is around an interactive architecture and public art proposal – the *Orbit Project*. This is an attempt to map the millennial configuration of the solar system onto a city landscape. A genuine art-science collaboration, each planetary site would generate its own artist's commission.

At the centre of the scheme is a giant orrery, housed in a glass dome. Its major features would be an interactive physical solar system model, with scaled rotating planets controlled by computer in

response to visitor's touch-screen commands. This will be housed in an glass dome etched with markings showing constellations and incorporating interactive electro-chromic or flat plasma glass displays, providing information about the solar system in response to visitor interrogation. Around the dome will be an interactive spatial music installations based on sound elements from the main planets recorded by radio telescope and activated by visitor presence and movement through Ultrasound detectors linked to midi sequencers. The surrounding podium and pavement will, through an artist's commission, celebrate historical and mythological understandings of the Sun.

The nine scaled planets will be housed in a sealed transparent glass cylinder towards the base of each 8-metre obelisk, constructed in similar modular form, but of varied high quality materials reflecting the geography of each planet. At each site, an artists' commission including strong community involvement, also interpreting associated mythology, would utilise and landscape the podium and pavement base. Interactive technologies would be part of the commissioning brief for each site. A pilot full scale model obelisk has already been temporarily shown in Bristol.

New Digital Landscapes and Subversions

In contrast to this rather formal and monumental project, there have been a number of attempts to create interactive architectural spaces by British artists. For example, Simon Biggs, with his installation *Heaven*, commissioned by the European Media Art Festival 1993 for a projection onto the ceiling of the Dominikanerkirche, Osnabrück, Germany, 18 metres above the viewers heads. *Heaven* uses remote visual sensing techniques to track the viewer. Each viewer was allocated an angel (or demon, depending on location) which followed the position of the viewer on the floor analogously on the ceiling. The viewers actions control not only the behaviour of the angels/demons but also a large range of other images, which are dynamically composed on the ceiling used audience movement to alter virtual architectural features such as angels and gargoyles projected onto the roof space. In the 1993 River Crossings public art project, Susan Collins's *Tunnel* similarly mapped responsive soundscapes and video projections into a pedestrian tunnel under the Thames.

In Britain the *Imag@nation*²³ Initiative, as mentioned earlier, is opening up opportunities for new media public works in the SW. The artist-led scheme is a million-pound initiative involving twelve major digital commissions, two conferences, workshops and a host of smaller events. The artists involved reflect a diversity of practice, but all are in some way related to a tradition of site-specific and community based practice where the monumental and corporate is often subverted. This is reflected in the installations of several of the artist initiators who see themselves as working with new genre, Public Art24.

My residency commission at Bristol's Watershed, *Screening the Virus*, was a part of World Aids Day arts initiative. It was a multimedia public art, piece based on experiences and issues raised by sufferers, carers, and friends of those with HIV or AIDS. A work in progress, it attempts a similar openness to public feedback as Gerz's monument. As a web space it will self-curate submitted images and words by an automatic comparison with a list of keywords. The site is planned as a set of four domains, or landscapes, based on the mediaeval humours of earth, water, air and fire. Each landscape stands for a different aspect of the experience of HIV/AIDS and contains a generic human figure. The figures form part of the selection interface. Callers' contributions in image and text – personal responses to different aspects of AIDS – determine the relative "health" of the figures, depending on the number and type of hits. The more positive the attention given by callers the healthier the bodies will appear (reflected through colour changes), thus acting as a "barometer" of the climate and nature of the attention the site receives. Any homophobic or abusive contributions will be included as part of the context of this electronic AIDS quilt. The site will also be projected as a three dimensional installation responding to audience through pressure pads and video detectors.²⁵

Annie Lovejoy is another lead artist in the *Imag@nation Initiative*. Her work also addresses difficult public issues-her digitally produced sugar packets were distributed throughout Bristol's recent *Festival of the Sea*, warning that much of the maritime wealth of the city came from earlier its involvement in the slave trade and its main products, sugar and tobacco. Her digital land/art works are sensitive reminders of the power of language. Her giant computer originated *Watermark* from 1996 at Newton-le-Street in Northumberland is a vast pun, visible for many miles. Sited by a canal, it comments on the scars of the first industrial revolution. The digitally designed grass in her 1995 *Shave*²⁶ residency piece *Pause* was cut out and watered for a week and then returned to its more arid site suggesting the relationships of nature through its videoplayer text.

One of my current collaborations is with Tony Eastman in a proposal for an interactive light causeway to St Michael's Mount in West Cornwall activated by tidal pressure with sound installations at either end based on the legend of the giant who is believed to have built castle rock, leaving a physical legacy in the form of a giant carved footprint.

A similar set of ideas informed my recent work *Here be Unicorns*, a playful installation which was part of the Open City Public art project in Bristol. The computer designed and cut steel unicorn templates referenced the gold unicorns mounted on top of the city hall. They were moved across a grassy area leaving their pale green shadows where the sunlight was blocked. As they were moved, images were

to be progressively etched on their surface, based on dreams posted by the public in a special "dreambox". They suggested the loss of an earlier legendary past where nature was an undivided whole. Mapping the public's dreams on the unicorns was an attempt to recall a part of that magic. My own dreams were shattered when one was stolen. The immediate response was to stage a scene of crime scenario using digital posters, where the public were invited to assist in its recovery. The other unicorn has found a home in a local school, covered in children's dreams.

Simon Poulter is another digital artist involved in *Imag@nation* who was originally graphic design. His public artwork deals with the power of the corporate through digital posters, websites, and multimedia pieces. He attempts to underline the contradictions behind the smooth facade of advertising. Through his "countermarking" company **UK Ltd**²⁷ he has variously attempted to sell Stonehenge, and "discovered" a fifteenth-century "scratch card." He ran a PR and marketing campaign in the manner of British Airways or British Gas. Pathfinder prospectuses were issued, along with press releases to MPs, business people, the media, and the public. This resulted in calls from national newspapers, Bank Managers and business people. The press releases declared **UK Ltd's** interest in complete deregulation, including its ambitious plan to privatize Stonehenge and turn it into a theme park. **UK Ltd** opened a number of "share shops" around the country, offering further information on its share portfolio. At each share shop, the CEO of **UK Ltd** has attended a launch and talked "keenly" to the general public about share ownership.

It sometimes seems there are as many types of public digital art as there are artists. As we have seen successful practice must place content and meaning above technology. It must achieve "distance" in its true sense of all elements in dearrelationship. But if it fails to engage with the full potential of those technologies, it fails to find the new form and meaning for which all art ultimately strives. The old voices may be saying the same things, but, as always, only the new voices can be heard by the tired ears of the "Public."

To quote Regina Cornwell:

"These explorations are crucial to how the world can be re-drawn and viewed in an art whose power is in its open-endedness and polyphony. And for the participant the installation too is hard work. To be meaningfully experienced demands time and serious attention."

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Propositional Music: On Emergent Properties in Morphogenesis and the Evolution of Music; Imponderable Forms, Self-Organization, and Compositional Methods September, 1997

Propositional Music

I am interested in musical thinking that includes the view of composition as the proposition of musical realities – complete cognitive models of music – using propositional musical language accompanied by a propositional language of music theory. This may also be related to what is called speculative music and speculative theory.

The term *propositional music* refers to a particular style of musical thinking in which the act of composing includes proposing complete musical realities, assuming no extant model of music and emphasizing the dynamic emergence of forms through evolution and transformation.

How can we make compositional models in our new environment of knowledge about self-organization and emergent forms? We must begin with an understanding about how perceptual distinctions are made, how forms emerge and how we categorize the distinctions that we can hear among kinds of complexity in adaptive systems when the nature of the musical language we are experiencing is not known a priori.

Comprehending Initially Undefined or Imponderable Forms

The universe is a self-organizing system in which transformation, evolution and change enable *entelechy* (actuality). Time is an axis of experience over which features and forms are articulated on other axes. Music is fundamentally involved with sculpting experiences in time. Outside of time, existence is undefined. To participate in the evolving universe, a state of mind must be maintained in which the *intelligent order* contained in observations must be sought without prior knowledge regarding the nature of that intelligence.

Order may be defined as giving attention to similar differences and to different similarities. The beauty of this definition lies in the assumption that order is an active form of manifesting distinctions, not a rigid objectification. In essence, all forms of distinction produce calls, making reference to particular differences around which unique singularities in space-time are created. These are particular distinctions with which we associate properties that result from our observing them interact with other such distinctions. In psychological time, such calls are always temporary. Emanating from each singularity, within the dimensionality of each call, is a zone of influence (a region within which a singularity is able to interact with other singularities), which is characterized, in part, by a notion of strength, associated with interacting forces, that decreases over distance from the singularity until the zone of influence becomes undefined.

We have here a kind of *verification* of the nouns of our language, which, in the arts, evinces a new kind of dematerialization with which we must become comfortable emotionally. Such dematerialization may ensue from a natural tendency to unbind what was materially and unnaturally fixed in the first place, returning it to a natural state of dynamism and freedom to evolve.

The development of cyberspace, defined as the broad realm of electronic memory, will accelerate this verification. Such an interactive space encourages focus on the discourse of imaginal dialogues. Objects valued in such networked exchanges will be preserved by circulating in resonant network wells, just as perceptions and synthesized memory idiologs persist in any evolving nervous system.

Though science shoulders the burden of hypothesis, experimental verification and fabricating models with predictive value, science and art share a poetic aspect: that of creative communication about

newly conceived orders. Though art is not required to predict the future behavior of the universe, artists may exhibit intense interest in considering it, and, in common with scientists, be inspired to make creative products that reveal new orders.

A useful task for art may be to provide exercises in comprehending the undefined.

The Nature of Forms

Form and *cause* are inextricably bound in the Western mind. It may be useful to consider the origins of our notions in this regard and our predilection to conceive form as stable substance.

Aristotle's idea of formal cause, perhaps as brought to us through the Medieval Scholastics or, at least, as interpreted in its most banal form, lies at the root, even today, of misapprehensions regarding form in art. This predominantly held idea is infused with a sense of the static. This stasis feeds resonating detectors for mental categories that support particular cognitive models needing reinforcement. One distinguishes sculpture from lumps of pre-formed raw material with the aid of these models. However, the order seekers evolving inside individual minds may extract ordered perceptions from the unformed lumps, calling into question their unformedness in a profound way. What we refer to as formed, by contrast, is usually imbued with the intelligence of the forming agent, which we somehow distinguish from the natural order of the unformed lumps.

A view of forms as *dynamic morphologies*, however, calls into question the distinction of these separate intelligences. Form emerges. Form evolves. Forms emanate from points of singular genesis, defining the space surrounding them, along with sets of dimensions and axes for describing their dynamic processes of change.

In recent times, some Western minds have begun to assimilate the impermanence of all forms and its ramifications for art making. The evolution of many constructs in Western philosophy has been coerced by the psychological demand for permanence in all structures – the heavens, the molecule, the atom, the fundamental forces and cosmological constants—when all life experience reinforces the presumption of continuous processes, interactions and morphodynamic change. Even the idea of numbers—the most purely permanent construct we have and the foundation of mathematics—is a cognitive pretext born of the continuous interaction of forces in the mind driving the obligation to differentiate, to identify one and then two. Following this, they must bear the burden of erecting a calculus of inductive inference with which to integrate the results.

On global scales, all distinctions result from interaction, not from the hierarchical imposition of ruling agents handing down ordering forces onto lesser agents. Those who act as ordering agents, as all life forces do, and who view themselves as rulers operate under an illusion. They are interacting, ordering agents in consort with all regionally effective forces. It may be that all hierarchical (i.e. global) descriptions are synthetic extractions. It may be viable to view only atomic level events and elements as foundational and all else as emergent, summary phenomena.

In the present age, which now includes the global phenomenon of cyberspace, defined as the realm of collective, electronic memory, interactivity through electronic communication networks naturally emerges as a consequence of self-organization. The only requirement for this is a technological society comprised of a critical mass of individuals. It has been hypothesized that in a universe with the proper values for certain of its fundamental physical characteristics, known as cosmological constants, intelligent information processing will naturally evolve. If this is true, then such electronic interactivity is a clearly foreseeable phenomenon of nature.

Compositional Methods: Premises for Making Propositional Music

A composer's license includes the opportunity to construct entire universes. It may be useful to consider some fundamental steps in constructing a compositional method.

- *Choose your universe.* What is the universal set for a work? The universal set will describe a domain of compositional attention and the kinds of distinctions that will be made as a result of compositional thought and choice. Thus, the items that will receive attention in composing are delineated. What are the elements of formal concern? This may include naming the parameters that will carry information that articulates forms. Note that these are generative parameters, not necessarily analytical ones. How will composer(s), performer(s) and listener(s) act as ordering agents in the musical experience? Note that musical attention may be directed towards things outside the realm of formal processes, particularly in listening. Compositional attention may also be directed towards things not traditionally considered to be musical.
- *How will the universe be ordered?* (Not, "how is it ordered.") List the potential generative relationships among distinctions in the universal set. For example, in the expression, $aRnb$, a and b are related to each other by relation, R_n . Can these R 's be listed? One useful composing tool is known as the relationship matrix. This is an array that shows whether the elements of a set are considered to be related to each other or not and, if so, how. Note again that these are generative relationships determined in the process of composing and are not necessarily given a priori.

- *What are the scales of measure for parametric values to be used?* How will parametric values be compared? For example, different types of measurement scales may be used, i.e. nominal (items are related only by labeling or classification with numbers), ordinal (numerical values indicate rank or order), interval (distances between numbers are equal but with no reference to zero) and ratio (each value measures a distance from zero) scales. Scales for relating pitches, timbres, sounds in spaces, the physical size of instruments, the spectrum of brainwaves and the geographical separation of performers linked in a communications network could all be examples. Multi-dimensional scaling – the construction of a mapping in which the closeness of items located in a contrived space of two or more dimensions is considered analogous to their similarity – may be used. The axes of such a space correspond to the parameters describing formal characteristics of items contained in the space. The language and means for making comparisons must be decided – e.g., how it will be determined that a is more like b than a is like c, and so on.
- *What are the levels of significant difference for each parameter?* Establish the criteria by which things are to be considered the same or different.
- *Design the compositional pragmatics needed to make arrangements among the distinctions in the universal set.* Establish the procedures through which unique musical works will be produced.

Improvisation

In one sense, improvisation is simply composition that is heard immediately rather than subsequently. The act of composing for improvisation may involve constructing a cognitive model of music, creating a good representation of the model to serve as a score and communicating that to musicians. The musicians, then, work from a model instead of a detailed score that is laid out in linear time.

A Self-Organizing Interactive Chamber Opera

On Being Invisible II (Hypatia Speaks to Jefferson in a Dream)

Introduction

Ideas about evolution appear as regular, thematic referents throughout much of my music. *On Being Invisible*, begun in 1976 and recently revived as *On Being Invisible II*, is a self-organizing, dynamical system, rather than a fixed musical composition. The title refers to the role of an individual within an evolving, dynamical environment, who makes decisions concerning when and how to be a conscious initiator of action and when simply to allow her or his internal dynamics to co-evolve with the system as a whole. Consequently, the work is always ongoing.

One of the objectives of the piece is to create an *attention-dependent, sonic environment*, in which a sound language orders itself spontaneously, according to the manner in which its components are perceived. To accomplish this, streams of sound events are generated by computers with predetermined compositional methods. Using a partial model of musical perception, the software analyzes them and attempts to predict which ones might be perceived by active listeners as having particular importance in the emerging musical structure. Usually, these correspond to things like the ends or beginnings of phrases or changes in textures or patterns. Then, signals from the brains of on-stage performers, known as *event-related potentials (ERPs)*, are tested to determine if these predictions can be confirmed and the events are, in fact, being heard as musical landmarks. If so, these kinds of sound events will gain prominence in the musical fabric. If not, the music-generating algorithms will begin to mutate into new forms. In this way, self-organizing, musical structures can emerge that are related to shifts of attention experienced by the performers. This is composition by listening. The evolving musical fabric exhibits characteristics of what we know today as *complex adaptive systems*, often used to model the evolution of life forms.

To accomplish this, techniques involving signal averaging, peak component analysis, predictive procedures and template matching have been developed for tracking some of the neural concomitants of the dynamics of musical attention and perception, particularly those involving auditory evoked responses (AEPs) – transient waveforms accompanying coordinated activity among groups of neurons involved in hierarchical processing of auditory stimuli – and using them to guide the evolution of spontaneously emerging musical forms.

The various parts of this feedback system remind me of characters in a mythological drama, the spontaneous forces of creativity, the drive to converge upon ordered relationships in society, the counterbalancing tension of divergence from order as our consciousness loses its focus on orderings from the past, and the fundamental uncertainties regarding nature's only partially knowable forces. Consequently, I began to think about it in narrative terms.

On Being Invisible II (Hypatia Speaks to Jefferson in a Dream) is an aesthetic proposition on these themes, maybe a *self-organizing opera*. The setting is a dream in which Thomas Jefferson hears the voice of the Greek, woman, astronomer, mathematician, and philosopher, Hypatia, traversing the centuries and continents and mingling with his own internal voices as he writes one of his later-to-be-famous, political statements. The opposing, ideological forces emerging from this scenario remind me of the delicacy with which the *On Being Invisible* performer must negotiate the thin dividing line that separates being part of something larger than one's self and trying to willfully direct a naturally

evolving process. The *invisibility* notion is represented by the dream state in which these conflicts energize Jefferson's thoughts, while entreaties to wisdom are transmitted through warps in space-time by the reincarnated mind of Hypatia.

Important References

Some of the work briefly introduced in this paper is explored much more thoroughly in the following publications by the author. The reader is encouraged to explore them as well.

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David Rosenboom Web Site—More writings and other information related to these topics is available on-line at the following URL:
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Re-embodied Intelligence

Abstract

Re-embodied intelligence can be defined as the translation of media elements and/or processes into a symbolic language enabling those elements and processes to become part of an operative computer-mediated system. The ability to "translate" the aesthetic conceptions of an author into a form that is operative within a technological environment, is fundamental to the creation of interactive artworks. We will consider "intelligence" as referring to activities we have in the past considered *intelligent*, like "playing chess say or recognising visual images." (Aleksander, p13) In the creation of artworks the artist employs modes of thinking that might be considered illogical, nonsensical, intuitive, metaphorical, non-linear. The *intelligence* embodied in an individual's art practice, functions in the service of their poetics. Already, in 1962, Eco saw the need for the use of multi-value logics, in terms of art production, which were "quite capable of incorporating indeterminacy as a valid stepping-stone in the cognitive process." (Eco, 1989, pps.14&15) How can the artist develop systems which re-embody multi-value logics, to work inter-dependently with systems which have traditionally been seen as singularly logical and non-emotive? Is there a set of salient properties intrinsic to interactive art production, that the artist can explore to become an "author" of responsive, self regulating systems, enabling "intelligent" emergent poetic responses to viewer interactivity?

Re-embodied Intelligence

Re-embodied intelligence can be defined as the translation of chosen media elements and/or processes into a symbolic language enabling those elements and processes to become part of an operative computer-mediated system. If we think about the creative processes artists go through in the making of non-computer-mediated works of art, is there a way to model these processes and re-embody them within a computer mediated environment? Along with the transformation of traditional media: photography, collage, concrete poetry, music etc. into the digital domain, how can artists generate models which are entirely driven by the new potentials of recombinant image, sound and text space inherent to the computer. In a sense we can think of a novel as a kind of condensed re-embodiment of the focused perceptions of the author, as presented via the technology of a book. Computers present a medium which heightens the potential for an intermingling of the intelligence of the viewer with the "re-embodied intelligence" of an author or set of authors. I am seeking to define a set of processes which are relevant to the production of interactive art, where the computer might function as a mediated extension of focused perception, both in terms of "sensing" and "responding." The ability to "translate" the aesthetic conceptions of an author into a form that is operative within a technological environment, is fundamental to the creation of interactive artworks.

A work of art can be seen as a container or vehicle of content. It contains the artifacts of thought and/or action of the artist. As works of art are authored that explore "operable" media, technological environments which enable the generation of emergent content open up entirely new fields of poetic investigation. We could think of these technological artworks as self-organising synthetic organisms which generate new vehicles of content based on a series of rule based procedures. These processes can reflect and embody the poetic sensibilities of the artist and function as a sensual extension of those sensibilities. It is interesting to note that Alan Turing speaks of "input" and "output" organs in his *Turing's ACE Report of 1946* (Turing, 1986), suggesting notions of sensing in the discussion of an Automatic Computing Engine.

Computers function via code. We can look at the code in terms of a series of 'authored' layers on a number of levels. We start at the bottom, with assembly language, we then have various other logical layers which now enable the construction of an upper layer of code which metaphorically floats on the surface of the system, being potentially non-hierarchical as well as non-linear. One can examine media objects as having a punning functionality; outwardly to the viewer, these media elements are carriers of content; inwardly - these elements enable the functionality of symbolic logic. I am examining computers as being expressive vehicles, propagating operative poetic elements via this series of interdependent levels of responsive "code" authoring.

The genealogy of such ideas can be historically traced. One could say that it was the intersection of poetics and mathematical logic which enabled the intuition in Ada Lovelace that eventually led to what came to be called computer programming. In the year 1842, in her *Notes by The Translator* written to clarify the work *Sketch Of the Analytical Engine Invented by Charles Babbage* which was authored by L. F. Menabrea, Ada Augusta, Countess of Lovelace, made some very enlightened remarks.

"The Analytical Engine is an embodying of the science of operations, constructed with particular reference to abstract number as the subject of those operations... Again, it [The Analytical Engine, emphasis the author] might act upon other things beside number were objects found whose mutual fundamental relations could be expressed by those of the abstract science of operations, and which should be also susceptible of adaptations to the action of the operating notation and mechanism of the engine. Supposing for instance, that the fundamental relations of pitched sounds in the science of harmony and of musical composition were susceptible of such expressions and adaptations, the engine might compose elaborate and scientific pieces of music of any degree of complexity or extent... It may be desirable to explain, that by the word operation, we mean any process which alters the relation of two or more things, be this relation of what kind it may. This is the most general definition and would include all subjects in the universe." ([Lovelace as found in] Babbage, 1961, p.249)

I find it fascinating that one of the first remarks related to computer programming would be to suggest that such mechanisms could become the vehicle of aesthetic inquiries.

In interactive works, viewers access processes which have been specifically authored enabling them to interact with the system which houses them. Emergent content can be generated as a product of this interaction. It is now possible to author interactive art works that exhibit "intelligent" responsiveness to viewer input. In *Thinking Machines, The Search for Artificial Intelligence* by Igor Aleksander and Piers Burnett, the authors state:

"Rather than becoming embroiled in the controversies which surround the nature of human intelligence, the practitioners of artificial intelligence have generally chosen to define their goals in empirical or operational terms rather than theoretical ones. An intelligent machine, they suggest, is able to do things which, if done by people, would be judged to require intelligence. On this basis, a definition of intelligence becomes unnecessary: The researcher simply chooses a task that seems to require intelligence (playing chess say or recognising visual images) and tries to build a machine that can accomplish it." (Aleksander, p13)

In this case, I am suggesting that the creation of works of art, which are intelligently responsive to viewer input, are thus exhibiting a form of intelligence. Like Aleksander and Burnett I also choose to leave the definition of "intelligence" open. Here, "intelligence" will be explored in the context of a new form of poetic construction which I call "Recombinant Poetics."¹ Artworks which explore "Recombinant Poetics" are characterised by the interaction of a viewer with a system of meaning which carries compressed potential meaning constructed of operative language, image and sound elements within an authored technological environment. The term "Recombinant Poetics" coined by the author in 1995, utilises the concept of recombinant DNA in a metaphorical manner, referring to technologically manipulated modules of sound, image and text which are "spliced" and/or recombined.

In works of art, processes which enable "intelligent" responsiveness within a computer-mediated system, may take many different forms, each related to the vision of the individual artist. In this way, the definition of "intelligence" can be slightly different than the machine "intelligence" associated with AI, although it would be inclusive of the definition mentioned above. An art work can intelligently explore nonsense, paradox, shifting fluid states of meaning, intentional displacement, sarcasm, irony,

specific sonic qualities, poetic language/image/sound relations etc. Areas which might be seen as too difficult or absurd to tackle under the auspices of Artificial Intelligence. For me, these areas of artistic investigation represent a rich exploration of potential content and exemplify machine-mediated intelligence.

As stated above, the translation of specific aesthetic processes into an operative computer-mediated form can be facilitated through modelling. In recent works I have modelled the artistic processes of writing a sentence in *The Exquisite Mechanism of Shivers*;² of writing short poems in *Passage Sets / One Pulls Pivots at the Tip Of the Tongue*;³ and of constructing virtual "installations" or 3D Image/Sound/Text worlds in my work *The World Generator / the Engine of Desire*.⁴ The responsiveness of these works, to viewer interaction, could be considered "intelligent" based on the definition presented above. The machine functions as a vehicle of my sensibilities which are activated and explored by the participant during poetic construction and navigation, enabling various levels of inter-authorship. I have "translated" models of particular processes, incorporating chosen/constructed recombinant elements, so that they can be explored within operative computer-mediated interactive art works. For example, In *The World Generator / The Engine of Desire*, one menu selection constructs an entire "world" based on a set of aesthetic parameters which have been authored by myself working in conjunction with the programmer Gideon May. It must be noted that re-embodied intelligence seeks to answer problems on an individual level of artistic production as opposed to the "universal" attempts of artificial intelligence. Thus different artists will re-embody their sensibility differently. It has been suggested that such a system actually functions as a re-embodied mind set. Chris Dodge also observed in conversation that the goal of such a system might actually be a form of re-embodied wisdom. The intelligence embodied in an individual's art practice, functions in the service of their poetics. Already, in 1962, Eco saw the need for the use of multi-value logics, in terms of art production, which were "quite capable of incorporating indeterminacy as a valid stepping-stone in the cognitive process." (Eco, 1989, pps.14&15)

Eco from *The Open Work*:

"The notion of 'possibility' is a philosophical canon which reflects a widespread tendency in contemporary science; the discarding of a static, syllogistic view of order, and a corresponding devolution of intellectual authority to personal decision, choice, and social context."

If a musical pattern no longer necessarily determines the immediately following one, if there is no tonal basis which allows the listener to infer the next steps in the arrangement of the musical discourse from what has physically preceded them, this is just part of a general breakdown in the concept of causation. The two-value truth logic which follows the classical aut-aut, the disjunctive dilemma between true and false, a fact and its contradictory, is no longer the only instrument of philosophical experiment. Multi-value logics are now gaining currency, and these are quite capable of incorporating indeterminacy as a valid stepping-stone in the cognitive process. In this general intellectual atmosphere, the poetics of the open work is particularly relevant: it posits the work of art stripped of necessary and foreseeable conclusions, works in which the performer's freedom functions as part of the discontinuity which contemporary physics recognises, not as an element of disorientation, but as an essential stage in all scientific verification procedures and also as the verifiable pattern of events in the subatomic world. (Eco, 1989, pps.14&15)

Contemporary art practice is in a continuous state of redefinition. Thus, any operative contemporary definition of poetics would have to include that which the artist deems as poetic. The intention of the artist becomes central, in that speculative works of this nature may function as the computer-mediated positing of a question as well as an answer.

The definition of "embody" follows:

1. to give bodily form to; to incarnate; to make corporeal; to invest with matter; as to embody the soul or spirit; a form embodied.
2. to give definite, tangible, or visible form to; to make concrete; as his speech embodied democratic ideals.
3. to collect and include (material) in a book, system, statue, etc.
4. to make (something) part of an organised whole; incorporate; as our ideas are embodied in the committee's report.

Synonyms: methodise, systematise, codify, incorporate, aggregate, integrate, compact, introduce, enlist, combine, comprehend.

Each of the different spokes of this definition are explored in terms of my art practice, as they are applied to the term "Re-embodied intelligence." The notion of "giving bodily form to" and "incarnating" is explored in my work in that I include my digitised voice. This presents a paradoxical examination of presence/absence as related to the sonic artefacts of the body via the presentation of emotive spoken language. Poetic language, image, and sound elements are given "definite," "tangible" form

within the operative networks which characterise my work; they form a "collection" of variables within a "system," like a "statue" the works embody aesthetic, representational elements; and each work is presented as a particular system of "organisation" for media material.

Central to a technological history relevant to Recombinant Poetics, is the notion of viewer association triggered via "conceptual machines." A "conceptual machine" can be defined as a machine engendered by language and in some cases via images. Such language can be in the form of a description, a recipe, a poetic text (as in Duchamp's Green box, Fluxus Boxes and operative poetic works by Raymond Queneau), a working virtual model, as well as in the form of language "translated" onto a punched card (as in the Jacquard loom and Analytical Engine); via an algorithm or through the operative properties of computer code as linked to a graphical user interface and/or expressive external device (robot, videodisc, etc.).

Artworks which explore "Re-embodied Intelligence" do so on a case-by-case basis, where the author and programmer translate a particular art related process or aesthetic into a computer mediated, operative form. Art embraces a myriad of expressions. In Recombinant Poetic works, relative shifting fluid states of content can be explored by the viewer in the process of navigation and poetic construction. We might see this as a paradoxical exploration of smooth and striated space in that discreet modules, when recombined enable emergent content. I will end here with a final quote by Ada Lovelace:

"In abstract mathematics, of course operations alter those particular relations which are involved in the considerations of number and space, and the results of operations are those particular results which correspond to the nature of the subjects of operation. But the science of operations, as derived from mathematics more especially, is a science of itself, and has its own abstract truth and value; just as logic has its own peculiar truth and value, independently of the subjects to which we may apply its reasonings and processes. Those who are accustomed to some of the more modern views of the above subject, will know that a few fundamental relations being true, certain other combinations of relations must of necessity follow; combinations unlimited in variety and extent if the deductions from the primary relations be carried on far enough." ([Lovelace as found in] Babbage, 1961, p.249)

I find it a lovely irony that the computer, a mechanism entirely based on logic, can be used to explore non-sense as well as illogical and elusive resonant content through navigation and poetic construction in Recombinant Poetic works.

1. Recombinant can be defined as follows, "Any new cell, individual, or molecule that is produced in the laboratory by recombinant DNA technology or that arises naturally as a result of recombination." (Parker, 1989) Recombinant DNA technology can be defined as follows, "In genetic engineering, a laboratory technique used to join deoxyribonucleic acid from different sources to produce an individual with a novel gene combination. Also known as gene splicing." (Parker, 1989) The term "Recombinant Poetics" utilises the concept of recombinant DNA in a metaphorical manner, referring to technologically manipulated modules of sound, image and text which are "spliced" and/or recombined. The term "Recombinant Poetics" was created by the author in 1995. It was introduced to Roy Ascott as a potential area of investigation at CAiA during ISEA (September 1995), and registered within the application title in December, 1995. Work delineating the concept was first published on the World Wide Web in April, 1996 on the CAiA website: <http://caiimind.nsa.d.gwent.ac.uk>. Subsequent research has shown a related metaphorical use of the word "recombinant" by Mitchell in his discussion of "recombinant architecture" (Mitchell 1995). Other artists and researchers have used the term "recombinant" in a metaphorical manner including Arthur Kroger (Kroger, 1994), and Diana Gromala. Gromala is currently working on a book called *Recombinant Devices: Ideologies of Virtual Design*. The notion of modular, recombinational systems can be witnessed in my work as early as 1981.

Notes

2. *The Exquisite Mechanism of Shivers*, © 1991 Seaman
3. *Passage Sets / One Pulls Pivots At The Tip Of The Tongue*, © 1995 Seaman
4. *The World Generator / The Engine of Desire*, © 1996/97 Seaman

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Gemini Rising, Moon in Apollo: Attitudes on the Relationship between Art and Technology in the US, 1966-711

"In the history of human thinking the most fruitful developments frequently take place at those points where two different lines of thought meet."

—Werner Heisenberg²

My research examines the complex and often conflicted attitudes towards the relationship between art and technology held by artists, engineers, and art historians in the 1960's, a time of intensive artistic experimentation with technology. In what follows, I shall analyze statements by artists John Cage and Robert Rauschenberg, engineer Billy Klüver, and art historian/curator Pontus Hultén (using philosopher Martin Heidegger's *The Question Concerning Technology* as a critical foil) in order to better understand what technology signified, and what signified technology, during this culturally, socially, and politically volatile period.³ Statements by Jack Burnham and Maurice Tuchman, who curated major art and technology events during this time, will also be considered for their insight into the potential conflicts between artists using technology and the corporations that sponsored exhibitions including their work. By exhuming the hidden presumptions buried in the 1960's discourses about art and technology, I hope to increase awareness of the historical, ideological underpinnings of these practices. The rhetoric of art and technology in the 1960's tends to be bifurcated into binary oppositions of reason and belief, so this paper slides between the same poles, revealing the limits of this critical method.⁴

John Cage

According to Cage, since the artist is the progenitor of a revolutionary heritage, then through collaborations between artists and engineers, this revolutionary element will be transferred to the technical servants of commerce and industry, resulting in a transformation of the social order. Even while claiming to want to remove the separation between artists and engineers, this particular formulation oversimplifies the categorical distinctions between them and reduces the characteristics of each to a predictable caricature. Cage unabashedly celebrates the artists while condescending to the engineers, and never explains how this transfer of revolutionary spirit from the one to the other would come about.

To his credit, Cage does express a common sentiment of the time that the world was out of balance, and that revolution was eminent. The perpetual threat of nuclear annihilation during the Cold War, exacerbated by the Bay of Pigs conflict, the unpopular war being fought in Viet Nam, the space race, and increasing concern about the deterioration of the Earth's ecology by industry, all weighed heavily on the minds of artists and intellectuals in the 1960's. And all fingers pointed to technology as the culprit: not technology, itself; but technology as the product of the growing "military-industrial complex" that President Eisenhower had warned of in his 1961 farewell address. Something had to be done to control the technologies which, it appeared, were beginning to control us.⁵

Let one should imagine that Cage's beliefs are restricted to the rarefied domain of art, electrical engineer Dr. Billy Klüver agrees with Cage's position, but considers it "tame" compared to his own.⁶ Klüver has stated that, "Art and technology go well together in a world run by people who consider boredom the greatest virtue."⁷ The Bell Labs laser researcher explained that, as a result of their training, engineers are "locked into a very restricted way of looking at the world," which prevents them from "using their brains to change the environment, to make a more human environment, as they should."⁸ He maintains, however, that artist-engineer collaborations can yield "technology [that] is for pleasure, variety, change, respect for individual choice and human relationships."⁹ By organizing such collaborations, Klüver came to believe that he "could change technology, and that art was a vehicle for that."¹⁰ He felt that there was an important role that he could play as an intermediary between artists and engineers, and ultimately left his job at Bell Labs in order to do just that – a move which testifies to Klüver's vision, commitment, and guts.

Theoretically, one might find it difficult to accept Klüver's assertions regarding the tunnel-vision that characterizes the engineering profession. Regardless of the similarity of their training, there are so many different types of engineers from so many diverse backgrounds that these individuals inevitably bring a great array of perspectives and creative strengths to their varied tasks. It may be hard to argue with the desirability of creating "a more human environment." But there would be little consensus of what would constitute that. The qualities that Klüver suggests – "pleasure, variety, change [and] respect for individuals" – are far from universal, even amongst the citizens of western democracies. One might question, as well, Klüver's assertion that engineers "should" use their brains in any particular way. It remains unclear here, as it was in Cage's statement, why artists are qualified to assume, or desirable in, the role of cultural model.¹¹

The program notes for *Nine Evenings* emphasized the importance of "feedback to industry from the interaction between artists and engineers."¹² Such ideas motivated the founding in 1966 of the group *Experiments in Art and Technology, Inc.* (E.A.T.) by Klüver and artist Robert Rauschenberg. For the November 1, 1967 issue of *E.A.T. News*, together they wrote the following manifesto – itself a collaboration between an engineer and an artist. This particular formulation expresses the "urgency we feel about the need for a new awareness and sense of responsibility" regarding the relationship between art and technology, and the long-range goals of E.A.T.:

MAINTAIN A CONSTRUCTIVE CLIMATE FOR THE RECOGNITION OF THE NEW TECHNOLOGY AND THE ARTS BY A CIVILIZED COLLABORATION BETWEEN GROUPS UNREALISTICALLY DEVELOPING IN ISOLATION.

ELIMINATE THE SEPARATION OF THE INDIVIDUAL FROM TECHNOLOGICAL CHANGE AND EXPAND AND ENRICH TECHNOLOGY TO GIVE THE INDIVIDUAL VARIETY, PLEASURE AND AVENUES FOR EXPLORATION AND INVOLVEMENT IN CONTEMPORARY LIFE.

ENCOURAGE INDUSTRIAL INITIATIVE IN GENERATING ORIGINAL FORETHOUGHT INSTEAD OF A COMPROMISE IN AFTERMATH, AND PRECIPITATE A MUTUAL AGREEMENT IN ORDER TO AVOID THE WASTE OF A CULTURAL REVOLUTION.¹³

The authors assert that it is unrealistic for art and technology to develop separately. But is it? These fields, if they can be called that, developed separately at least from the Renaissance, becoming increasingly specialized as a result of that autonomy. If their isolated development is no longer realistic in the mid-twentieth century, is that because that specialization has created a "less human environment"? But then what would that mean? What, moreover, would characterize a "civilized collaboration"? Perhaps an "uncivilized collaboration" would provide more of the "variety, pleasure, and avenues for exploration..." that Rauschenberg and Klüver sought. As Jasja Reichardt, curator of *Cybernetic Serendipity* (1968) argued, "artists like Takis, Tinguely, ... Paik [and others] ... have consistently made use of technology without the help of any specific organization."¹⁴ What is so striking in Klüver and Rauschenberg's final sentence, is their belief, or veiled threat, that if industry did not change its ways, there would inevitably be a revolution, and that would be – pariah of efficient engineering – "wasteful." In this sense, Cage's idea of the artist as revolutionary has become transformed into the idea of the artist as the key to efficiency and the prevention of revolution.

If *Nine Evenings* represents the more free-wheeling, self-organizing, and independent end of the art and technology spectrum, *The Machine: As Seen at the End of the Mechanical Age*, represents its measured, institutional, and domesticated end. K.G. Pontus Hultén's large-scale, trans-historical exhibition

of art and technology, including work by some one hundred artists, opened at the Museum of Modern Art (MOMA) in New York in 1968.¹⁵ The Machine broadly surveyed the historical intersections of art and technology, ranging from Leonardo DaVinci's drawings of visionary flying machines (c. 1485-90) to a commissioned competition amongst contemporary artist-engineer collaborations, publicized and overseen by E.A.T.¹⁶ By endorsing this interdependent history with MOMA's seal of approval, Hultén sought, in part, to overcome popular prejudices against the use of technological media in art as threatening the humanist values of originality and beauty.

Hultén's introductory essay in the distinctive, steel-clad catalogue, offers an example of the complex and "conflicted" (his word) views regarding the relationship between art, technology, and the human that are characteristic of the late 1960s. On the last page Hultén writes:

"From the mid-fifties on, they [artists] have devoted themselves to an attempt to establish better relations with technology. Standing astonished and enchanted amid a world of machines, these artists are determined not to allow themselves to be duped by them. Their art expresses an optimistic view toward man, the creator of machines, rather than toward technology as such. They lead us to believe that in the future we may be able to achieve other, more worthy relations with machines. They have shown that while different aspects of our relations to machines may conflict, they are not necessarily contradictory. Not technology, but our misuse of it, is to blame for our present predicament."¹⁷

If Hultén's text appears naïve today because of its faith in human control over technology, it is equally remarkable for the self-consciousness of the author's conflicted "relations with machines," and the sincerity of his endeavor, which pushes him to the boundaries of his own belief system. Several paragraphs later, Hultén considers and dismisses the "frightening ... notion that modern technology has an evolution of its own, which is uncontrollable and independent of human will." In these passages Hultén takes a position at odds with the pessimistic technological determinism characteristic of, say, Martin Heidegger. The philosopher wrote that "Man stands so decisively in subservience to the challenging-forth of [technological] enframing that he fails to see himself as the one spoken to." He continues, "The threat has already afflicted man in his essence."¹⁸ But just when the fate and free will of humankind appear to be reduced to "standing reserve," by a technological way of ordering the world, it turns out according to Heidegger, that techné always has embodied art, and that poiesis offers an alternative way of knowing and being. Thus, by a mystical feat of etymological association (that ironically recalls the classical stage device of *deus ex machina*) Heidegger concludes that art offers salvation from the "darkening world" of "technological enframing."¹⁹ It must be noted that, by blaming the loss of human control over technology on a perverse and pervasive system of knowledge, Heidegger, a Nazi sympathizer, might allay German guilt over the holocaust. At the same time, given the elevation of art to the quasi-spiritual level of philosophy and religion in the German philosophical tradition of Kant and Hegel, Heidegger could have faith in art when there was little else in which to believe.

Anticipating McLuhan, Heidegger believed that the technological had infected humanity at its "essence," becoming part of, and inseparable from, human consciousness. In contrast, for Hultén, the human and the technological remain more highly autonomous entities, with the former being firmly in control of the latter. Though earlier in his essay the art historian enumerated many of the historically and potentially destructive aspects of machines, ultimately he believed that the artist's (and curator's) "unduped" use of technology supported progressive concerns, and provided inspiration for loftier human-machine relations. But by failing to rigorously examine the ways in which technology might very subtly delude those who use it, Hultén's position rests on a hopeful handshake that the strength of human will is incorruptible by it.²⁰

Hultén's exhibition also included examples of early photographic and cinematic cameras, as well as photographs and films, which he claimed "provided the basis for much of our way of seeing."²¹ Thus while he acknowledged the significance of the proliferation and dissemination of mechanical reproduction – which was rare at that time in a museum context – Hultén did not question the nature of that impact, such as the loss of aura, availability to the masses, and political potential, that Walter Benjamin considered. Like Cage, Rauschenberg, and Klüver, Hultén urged that "the decisions that shape our society in the future must be based on the same criteria of respect and appreciation for human capacities, freedom, and responsibility that prevail in art." Hultén argued further that "we must attain a society based on other values than buying and selling," though he does not go so far as to question art's complicity in the "culture industry" and its promotion of commodity capitalism, as Horkheimer and Adorno suggested. Neither is it surprising that Hultén does not discuss the spectacle of art and technology manufactured by major art institutions as a consumable commodity, as Guy Debord would have insisted upon.²²

Hultén's catalog dedication offers a final example of his complex "relation with technology." For the curator dedicated the exhibition not to a family member, but to "the mechanical machine, the great creator and destroyer, at a difficult moment in its life when, for the first time, its reign is threatened by other tools." Thus, not only is the mechanical machine eulogized as a sentient being endowed

with the properties of "life," and subject to an implied demise, but it is deemed worthy of praise and honor for its contribution to the author's life and work. Ironically, Hultén claimed that "art expresses an optimistic view toward man, the creator of machines, rather than toward technology as such," but he nonetheless dedicated the catalog to technology as such, and not to the men and women who design and use it.

Hultén's dictum that "different aspects of our relations to machines may conflict" applies well to the art discourse on technology in the 1960s. John Cage believed that the revolutionary heritage of artists could be transferred to engineers with whom they worked, giving rise to changes in the social structure. Billy Klüver and Robert Rauschenberg maintained that collaborations between artists and engineers would "create a more human environment," and that technology could offer greater "pleasure, variety, and involvement in . . . life," thus averting the "waste of a cultural revolution." Pontus Hultén held that technology itself was benign, but not the misuse of it; yet, he had faith in the human ability to control technology, and not be duped by it. Martin Heidegger thought that technology had duped humankind and taken control of consciousness, but that this condition contained the seeds of its own undoing; for art could provide alternative cognitive methods, and rescue humanity from the "darkening world" of "technological enframing."

I have introduced all of these assertions in order to examine their assumptions and claims, and provide a historical background for understanding the relationship between art and technology at a particular moment. When subjected to such analysis these positions appear variously naive, pompous, and like so much wishful thinking. One might ask why these very brilliant men all believed that art possesses special and redemptive powers vis-à-vis technology, even though they could not identify – in completely rational ways – what that redemptive power might be. Why is it, moreover, that so many people, from all walks of life, still believe, or want to believe, in art as a force for benevolent change? Why, also, did a number of the engineers who worked with Klüver on Nine Evenings recently say of their interaction with artists that it did open their eyes and change their lives?²³ The answer must be that to some degree this hope may be justified. Art is indeed a special category of human imagination and labor. Art does function according to different rules than engineering. Art can and does open people's eyes and minds, and change people's lives. So does engineering in its way. . . .

Perhaps Heidegger was keenly insightful when he suggested that technology holds art within it. And, like the process of technological enframing, so art enters into and transforms humanity at its essence, on the level of consciousness. And this unfolding of art occurs in mysterious ways, over great expanses of time and place, as British artist, and self-proclaimed "concept engineer," John Latham has theorized in his concept of "time base." This theory postulates the long-term integration of aesthetic concepts into consciousness as different from the short term ways in which other types of learning become incorporated into behavior. With this philosophy in mind, Latham, along with Barbara Steveni, Jeffrey Shaw, and Barry Flanagan, founded the Artists Placement Group (APG) in 1966, the mission of which was to place artists as observers and consultants within large corporations, where their unique vision and problem-solving capabilities could contribute to the transformation of industry.²⁴

Clearly artists have a crucial role to play in creatively giving form and meaning to technology and society. And while it may be difficult to understand exactly why and how that is so, it is obvious why it is so important for artists to be critical of technology and its relationship to art. For the goals of artists and industry are not always commensurable, sometimes precluding the possibility of collaboration, and necessitating opposition to the institutions that support art.

In 1969, the same year that French artist Jean Toche ridiculed and protested the exhibition "New York Painting and Sculpture: 1940-1970" in an action in front of the Metropolitan Museum of Art, art historian Jack Burnham invited him to exhibit a work of art in the Software exhibition at the Jewish Museum. Art critic Grace Glueck reported that the piece was to have been comprised of a "walk-in tunnel of air contaminated by noxious – but non-poisonous – gas, whose daily pollution level would tally with the city's."²⁵ When Toche was informed that a major US automobile manufacturer was the primary sponsor of the exhibition, he withdrew from it, claiming, according to Glueck that "it would be hypocritical for him to contribute a work condemning air pollution when the show's chief backer, American Motors, is [in Toche's words] 'one of the major contributors to air pollution.'"²⁶ Burnham replied that "all progressive things are accomplished with the aid of the System, whether it likes it or not. If Toche withdraws from the show, he's missing a big opportunity to use the inherent energy of the system – American Motors and the Museum – to make his point."²⁷ Later, in an interview with artist Willoughby Sharp, a founder of the Art Worker's Coalition of which Toche was a member, Burnham noted that during this period, a number of curators made explicit their sources of exhibition funding, so that,

"... the artist is put in the compromising position of making pieces with money whose source he knows. Somehow the fact that the Guggenheim Foundation's grant come[s] from the copper mines of South America doesn't bother artists half so much as openly working with American Motors money."²⁸

Similarly, Maurice Tuchman, who initiated the remarkably ambitious Art and Technology Program at

the Los Angeles Museum of Art, explained that he had,

"... expected resistance from artists. . . on "moral" grounds – opposition, that is, to collaborating in any way with the temples of Capitalism, or, more particularly, with militarily involved industry. This issue never became consequential in terms of our program, perhaps because the politically conscious artist saw himself, to speak metaphorically, as a Trotsky writing for the Hearst Empire. However, I suspect that if Art and Technology were beginning now [in 1971] instead of 1967, many of the same artists would not have participated."²⁹

While art as a form of protest, and protests by artists against the institutional constraints that bore down upon their practice, were not uncommon, Toche was rare in boycotting an exhibition on "moral" grounds.³⁰ But his example raises many important questions. Would it have been possible for Toche's piece to function, as Tuchman suggested, like "Trotsky writing for the Hearst Empire" in an American Motors-sponsored exhibition? Or would its critical message have benefited the sponsor, by making automobile manufacturer appear to be concerned not only with art, but with the problem of pollution? Are, as Burnham claimed, "all progressive things accomplished with the aid of the system?" Or do things accomplished with the aid of the system merely reify and reinforce it?

Because the public reception of Software is difficult to ascertain (in part because of several controversies surrounding the show, ongoing technical difficulties, and other factors) it is unclear to what degree American Motors (AMC) benefited – or suffered – from its association with the exhibition. The New York Times reported that AMC was honored by the New York Board of Trade with an award "for its support of an experimental exhibition, Software. . . ."³¹ Certainly the automobile manufacturer exhibited remarkable vision in bravely funding a challenging, if not risky, venture, and arguably deserved the award as much as any corporate sponsor. But it also turns out that David Finn, principal of Ruder & Finn, the fine art consulting firm that helped secure funding for, organize, and publicize Software, was on the boards of both the Jewish Museum and the Business and the Arts Advisory Council of the New York Board of Trade.³² It is no surprise that in art-business partnerships one hand proverbially washes the other. Such a revelation does suggest how "the system" benefits as a result of its support of culturally progressive events, aided in part through its behind-the-scenes connections.³³

Finally, in the Software show, a young artist named Ted Victoria exhibited *Solar Audio Window Transmission* (1969-70).³⁴ Solar panels powered ten transistor radios, which were connected to contact sound reproducers placed on the windows of the building, turning the Jewish Museum into a giant, faintly audible speaker that could be heard only by placing one's ear very close to or against a window. The performance of the piece varied with the weather, an ironic element especially when listening to a weather broadcast, since only clear weather reports could be heard. In a recent interview, Victoria confessed that at the time he was not especially concerned with pollution, or with advocating the use of renewable energy sources.³⁵ On the contrary, his work was based on the idea of transforming the energy of the sun into information, making the museum itself an active component in the piece, and engaging the audience to interact in new ways with the physical structure of the museum. *Solar Audio Window Transmission* was not especially high-tech and was assembled from pre-manufactured components. It was not politically engaged in any particular or conscious way, though in the context of the AMC-sponsored exhibition, it could not help but take on a resonance of opposition and resistance. It stands out, moreover, as a remarkably subtle and sophisticated use of technology for art, an art that knows its own value as a powerful, transformative force in society that gives form to the invisible shapes of energy, information, and intelligence all about us.

1. This paper constitutes a portion of the author's dissertation research, undertaken in the Department of Art & Art History, Duke University. It was originally presented at the ISEA97 conference at the Art Institute of Chicago on September 25, 1997. I would like to thank: my wonderful father, Mayor Shanken, for materializing unexpectedly in Chicago to attend my presentation; Dr. Kristine Stiles for her constant faith in me and my work, and for her superb editing which was indispensable to giving shape to this essay; Billy Klüver and Julie Martin for generously sharing their time, archives, and other resources with me during a fascinating and lengthy interview; Karl Katz, for two very interesting and insightful telephone conversations; Ted Victoria for a delightful telephone interview; Willoughby Sharp for being Willoughby Sharp, and for graciously sharing his experiences, archives, and insights with me; The Jewish Museum for permitting me access to their excellent archives; and Peter, Julie, and Winslow Ziv for their friendship and generous hospitality during numerous (and sometimes extended!) visits to Chicago.
2. Werner Heisenberg, *Physics and Philosophy: The Revolution in Modern Science* (London: Allen & Unwin, 1959): 161. See also Walker, fn. 24.
3. I recognize that this small sampling of attitudes does not represent the variety of feelings about the relationship between art and technology at the time, but suspect that it does at least give an indication of some important tendencies in the field of art.
4. *Experiments in Art and Technology*, "Trailer introducing Ten Documentary Films from Nine Evenings: Theatre & Engineering, October 13-23, 1966." VHS. Produced by Billy Klüver and Julie Martin. Author's transcription of Cage's oral statement.

5. A more thorough investigation of these historical circumstances and their relationship to the application of technology to art during this time comprises a key component of my dissertation research.
6. Interview with Klüver, September 19, 1997.
7. Douglas Davis, "Art and Technology Conversations. Billy Klüver: The Engineer as a Work of Art." *Art in America* 56:1 (Jan - Feb, 1968): 42.
8. Interview with Klüver, September 19, 1997.
9. Davis, *Art and Technology*: 42.
10. Interview with Klüver, September 19, 1997.
11. Just as there are many different types of engineers, there are many different types of artists. Some of those artists might make the world more boring and less human from Klüver's perspective.
12. Billy Klüver, "Nine Evenings: Theatre and Engineering" *Performance Program*, 1966, no page numbers.
13. Robert Rauschenberg and Billy Klüver, (untitled) *E.A.T. News* 1:3 (November 1, 1967): 5. Reproduced in all-caps, as it originally appeared.
14. Jasja Reichardt, "E.A.T. and after" *Studio International* 175:900 (May 68): 237. Tinguely, in fact, collaborated with Klüver, but such individual collaborations are not really the issue. The need for a "specific organization" arises, presumably, when a more widespread desire from artists for engineering expertise exceeds the ability of the handful of engineers (who, like Klüver were willing to work with them) to satisfy the increase in demand.
15. The show later traveled to the San Francisco Museum of Modern Art, and the Institute for the Arts at Rice University, Houston, Texas. The catalog indicates that the exhibition was scheduled to travel to the University of St. Thomas in Houston, Texas, where Dominique de Menil was Chairman of the Art Department. In fact, it traveled to Rice University, where de Menil had become Director of the new Institute for the Arts.
16. Hultén wanted approximately ten such works. The response was so enthusiastic, resulting in 137 submissions, that E.A.T. organized an independent exhibition, *Some More Beginnings*, which was shown at the Brooklyn Museum of Art concurrently with *Machine as Seen*. See "Experiments in Art and Technology, Some More Beginnings." New York: *Experiments in Art and Technology, Inc.*, 1968. Klüver had collaborated with Hultén before, bringing American works to Stockholm for the latter's exhibition *Art in Motion* at the Moderna Museet in 1960. See Billy Klüver, "What Are You Working on Now? A Pictorial Memoir of the 60s." *New York Experiments in Art and Technology*, 1983.
17. K.G. Pontus Hultén, *The Machine as Seen at the End of the Machine Age*, (New York: Museum of Modern Art, 1968): 13. Unless otherwise noted, all other quotes are from this page of Hultén's catalog.
18. Martin Heidegger, "The Question Concerning Technology," *Basic Writings*, David Farrell Krell, Ed. (New York: HarperCollins, 1977, 1993): 332-3.
19. Heidegger's move bears similarity to Marx's theory that historical economic systems contain the seeds of revolution that ultimately did, or would, overthrow them.
20. Though his resolution is unconvincing, Heidegger, to his credit, did seriously consider this question.
21. Hultén, *The Machine as Seen*: 3.
22. See Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction" in *Illuminations*. Ed., Hannah Arendt. (New York: Schocken, 1969): 217-251, and Max Horkheimer and Theodore W. Adorno, "The Culture Industry: Enlightenment as Mass Deception" in *Dialectic of Enlightenment* (New York: Continuum, 1993). 120-167, and Guy Debord, *Society of the Spectacle*. Detroit: Editions Champ Libre, 1970.
23. Interview with Klüver, September 19, 1997. I am paraphrasing Klüver's description of the engineers' accounts.
24. See John A. Walker, John Latham: *The Incidental Person -- His Art and Ideas*. Middlesex: Middlesex University Press, 1995. See especially pp. 97-101 on APG. The quote from Heisenberg is also cited in Walker's text, p. 19.
25. Grace Glueck, "Art Notes: Wares" *New York Times*, December 21, 1969.
26. Ibid.
27. Ibid.
28. Willoughby Sharp, "Willoughby Sharp Interviews Jack Burnham," *Arts* 45:2 (Nov., 1970): 21. Sharp, who had organized several exhibitions of, and written about, kinetic, air, and light art, might have disagreed. Along with Liza Behr and John Perrault, he accompanied artist Takis to MOMA on January 4, 1969, and removed the Greek artist's work from Hultén's *The Machine* exhibition. The new works the museum had promised to show were not included, but instead – and without Takis' consent – MOMA displayed an older work from its collection. This act of resistance led to the formation of the Art Worker's Coalition. Author's interview with Willoughby Sharp, October 1, 1997. The Takis work exhibited, *Tele-Sculpture* (1960) was donated by John and Dominique de Menil, who played an important role in bringing *The Machine* to Houston. See fn.
- 15.
29. Maurice Tuchman, *A Report on the Art and Technology Program at the Los Angeles County Museum of Art: 1967-1971* (Los Angeles: Los Angeles County Museum of Art): 17. My emphasis.
30. For example, Öyvind Fahlström's performance *Kisses Sweeter than Wine* at Nine Evenings and Carolee Schneemann's performance *Snows* that E.A.T. engineered at the Martinique Theater (1967) both incorporated relatively complex technology, in artistic protests against the war in Viet Nam.
31. George Gent, "Board of Trade Honors Businesses' Aid to Arts," *New York Times*, November 20, 1970.
32. I discovered Finn's association both with the Jewish Museum and the New York Board of Trade while working in the archives of the Jewish Museum.
33. It is arguable that museums benefit from the acclaim received by their corporate patrons for supporting culture, increasing the likelihood of further support. In this light, David Finn succeeded at helping both the Jewish Museum and American Motors achieve their individual goals. But this "win-win" scenario is muddled by the burden of association that particular corporate sponsors bring to bear on works of art exhibited under their aegis. In other words, just as a corporation's public image is affected by its association with the arts, so the reception and meaning of an artwork is not separable from the institutional context – including the sponsorship – in which it appears. By bringing this association into the gallery, the museum influences the interpretive context for its exhibitions. Toche was keenly aware of this problem.
34. Jack Burnham, *Software. Information Technology: Its New Meaning for Art*. (New York: The Jewish Museum, 1970): 40-1. This exhibition catalog was never distributed at the museum because the trustees of the Jewish Theological Seminary did not approve of the full-frontal nude picture on page 48, of artist Don Burg's *Selected Mental & Physical Characteristics of Donald Burg*. Interview with Karl Katz, September 19, 1997. It is ironic that in such a theoretically and technologically challenging exhibition (including the first public display of a hypertext system, by Ted Nelson) the most traditional subject – the male nude – should cause such controversy.
35. Author's interview with the artist. Victoria said that he wished that he could take credit for a greater environmental awareness, but that in honesty, it was not his primary concern. This work grew out of the artist's earlier experiments with solar energy, c. 1964-5, when popular awareness of environmental issues was substantially less prevalent.

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History and Theory of Intermedia in Visual Culture

Taking as a starting point the history and the discourse of intermedia, my paper relates to the current debates of intermedia describing the phenomena of crossing the borders between traditional media (such as painting and photography) and contemporary media (such as cinema, television, video, and digital technologies). What I am interested in is to show the ways that the processes of interrelation are transforming the notion of the image. From that point of view I will focus on the visual devices of intermedia in recent media art.

Intermedia, multimedia, hypertext, and other related terms are common in the contemporary debates on recent developments in new media. Evidently, a variety of terms are used to name processes in which there is an interrelationship, a dialogue between two elements of differing media. The variety of names is a reflection of the current media debate which tries to comprehend, to determine and to communicate the combinations of diverse and heterogeneous elements which are recognizable within the recent developments of audio-visual media. Approaches in Cultural and Media Studies, semiotic and formal theories, when viewed together show the difficulties to come to terms with those new forms effected by the ways that elements of different media relate to each other.

In general, intermedia means an interrelationship of distinct media that merge with each other, such as a photographic still image reworked in another media such as film or video. The painter and filmmaker Peter Greenaway gives a striking example of this in his electronic film *Prospero's Books* (1991) where he reworks elements of photography and film in digital media. Greenaway reworks the interval that relates to photography and film on the level of the digitally represented image thereby creating a new form of computed image that relates the static and the moving image to each other. Thus, the structural elements that are specific to different media, like the interval, are correlated on the representational level. The result of this correlation is a structural comparison of different media that is effected by the collision of different types of movement and velocity within the unit of one single image. I will call this collision a hyperdynamic image position.

The hyperdynamic image position shows such processes of correlation, collision, and transformation that result in a mixed form of image. The hyperdynamic image position represents a form of intermedia insofar as this represents a point of collision in which the structural differences between the static, the moving and the computed images are made visible on the level of representation. The paradox

structure of this point of collision represents the processes of transformation. The hyperdynamic image position expresses an intermediate step between different visual media. Finally, it shows that the distinction between the media is an essential issue in intermedia.

The appearance of an intermediate state in the development of media has as its prerequisite the existence beforehand of different, distinct media. Only that which is distinct can merge. This definition is a result of the assumption that the development of intermedia historically coincides with the emergence of technological media, namely photography and film. Furthermore, with the emergence of the digital media intermedia becomes self-referential, since with digital media the former distinction between the media are no longer relevant.

Zbigniew Rybczynski shows the limits of intermedia when the differences between the media are blurred. With his concept of a coherent image, Rybczynski shows the shift from analogue to digital media, performing processes of multiple layerings, thereby revealing on a representational level the distinction between media is not relevant. In the HDTV videofilm *Kafka* (1992) Rybczynski uses the device of motion simulation to create the effect of a coherent image that encompasses up to seventy layerings. Such devices – on the edge of digital media but performed on the analogue level – show intermedia become self-referential since the difference between the different elements are no longer visible.

Thus, the coherent image of Rybczynski and the hyperdynamic image position of Greenaway, are examples of two different concepts to relate elements of different media to each other. The coherent image is a result of a motion simulation that makes the devices of merging and layering invisible. On the contrary, with the incoherent image of Greenaway, the merging of media to be identified as intermedia is essentially based on the difference that can be recognized. Concerning media arts the visibility of the difference is expressed in the form and the shape of the artwork. From this point of view the modes of merging can be described in terms of collision, exchange and transformation. Collision results from elements of moving images and of static images that are related to each other in the form of another medium, in a computed image. On the representational level the collision is performed within a structure of exchange that is to say the coherent and the incoherent aspects of both elements combined are made clear. The form of an intermedia artwork is thus defined by the exchange and transformation of elements that come from different media, such as painting, photography, film, video and other electronic media. The transformation is the visible form that shows the results of collision and exchange in the form of a new image, for example in a hyperdynamic image position. Transformation is a structural category to express the ways that those different elements are connected and merge into each other thereby creating a new form.

Intermedia therefore is a formal category of exchange. It signifies an aesthetic device encompassing both form and content. In an intermedia work of art content becomes a formal category to reveal the structure of combination and collision. The related meaning of content is to express such modes of transformation that are effected by the collision of painting and film, of film and electronic media, and so on. The context meaning of intermedia is to reveal the form of media itself. The making visible of elements that are considered media specific can be performed by ways of comparing and transforming elements like the interval. Since the concept of the interval can be identified in different media such as painting, photography, and film, it may serve as the level of structural comparison between distinct media. What can be compared is the use of the concept of interval on the level of representation.

The notion of intermedia provokes a shift in the form of the medium by bringing together distinct elements of different media. As an aesthetic device intermedia brings together diverse elements that were originally taken from different media. To consider an intermedia artwork is to deal with the processes of transformation that are reflected in the structure and form of the artwork. In relation to the static, moving and computed image the transformation between such different images is a reworking of elements such as interval to be performed at the representational level. Thus, the reworking of media specific elements on another level of representation results in making structural differences and similarities between two or more different media visible. What happens is the process changes fundamentally and the aesthetics of images are affected by the process. Thus, the process involved in working with a given medium can effect a conceptual change in the notion of the image.

Intermedia is a concept of merging based on historically separate developments. In the case of digital media all different media are integrated that is to say they merge with each other within the same technical structure. As the German computer scientist Wolfgang Coy says: "All written, optical, and electric media with the use of microelectronics and computer techniques finally will merge into one universal digital media." The universal medium is often named hypermedia, thus signifying a multidimensional structure. This means that the computer is a building block for creating new hypermedia. Hypermedia, the term was introduced by Ted Nelson to describe media which perform "multidimensional ways" of branching. That is to say hypermedia is an ability to move in non-linear way through information. The point is how to access different media; the distinction between media is not the issue in hypermedia. Multidimensional connectivity and interactivity which are associated with hypermedia do not rely on the same transformation category essentially concerned with intermedia. The non-sequential structure in the first place indicates an option to connect each single digital media

to another one. The networking in hypermedia differs from intermedia in which the connection of different media involves a transformation.

Intermedia not only differs from hypermedia but also from multimedia, and mixed media. Both are comparable to hypermedia insofar as they describe the expansion of a single medium in terms of accumulation rather than transformation. In his essay on intermedia Dick Higgins describes the different concept: "Intermedia differ from mixed media; an opera is a mixed medium, inasmuch as we know what is the music, what is the text, and what is the mise-en-scène. In an intermedium, on the other hand, there is a conceptual fusion." Referring to art forms, in particular avant-garde art, multimedia and mixed media can be identified within happenings, fluxus-performances, and related forms combining live art and film. All those connect and combine different art forms on a level that does not necessarily involve a changing of the structure of each single medium. To conclude: multimedia and mixed media are considered on the edge of intermedia, that is to say dealing with similar phenomena. In a historical view the cross-relations become even more evident. Regarding the medium film intermedia aspects can be traced in the early phase of the medium film itself insofar as film brings together elements from literature, music, dance, and theater, but the medium film is not per se intermedia.

In consequence intermedia in visual culture is best expressed by modes of self-reflection. Self-reflection refers to a media specific device which is used to link formal aspects of different visual media, like painting, film, and electronic media. In particular, those forms of an image that have occurred in one single medium undergo a process of remodelling and reshaping when they are transferred into the context of another visual medium. Transferring means transformation when the structural elements of both media are made evident and visible in a form that tells the difference. Because self-reflection reveals simultaneously those elements of incoherence and those of coherence, it seems to be an appropriate device to tell the specific interrelation of two different media. Transformation here has a twofold meaning: one concerns the dialogue between distinct elements which merge into each other; the other one is the collision of separate elements. Thus, self-reflection is the most striking device to make clear the twofold structure of transformation by revealing the ways that different media can be connected in one form. In visual culture an intermedia state of art occurs when the forms of different media collide in another form effected by transformation.

In the 3-D video-installation *Kur* (1997) Clea T. Waite dismantles the twofold structure of intermedia. The work simultaneously shows the merging of different moments in time into one single image and the presence of parallel time on four screens, that is to say as multiple reality and multiple self. *Kur* represents parallel time in a simulation of space. The three-dimensional simulation of space reveals the concept of time in space. The concept of space simulates how different times may exist parallel that is to say at the same time. This concept of duality is expressed by specific image devices: These are: the electronic flicker that simulates the flicker in the medium film. The electronic flicker is used to represent simultaneously two different times. The digital feedback causes an aesthetic effect that makes the time trail visible. This effect creates a spatial sculpture that makes different moments in time visible. The partial effect results from the reworking of density. The effect shows the distortion and the recreation of images. This process compresses and decompresses space in time thereby giving an example of transformation between different forms of images. The three-dimensional video-installation shows time images that merge into space and spatial images that merge into time. What is important is that the difference is made visible within the image itself.

To conclude: The current debates of intermedia bring together approaches deriving from literary theory, art history, film theory and media theory, including debates on computer and virtual reality. The discourse on intermedia encompasses an aesthetic practice in media art, the structure of cultural and artistic processes, and a technological metaphor, whereas the distinction from multimedia or hypertext is not so clear. Conceptually the meanings of "inter", "multi", and "hyper" are not coherent. The understanding of the phenomena described as intermedia shift in different discourses. Similar phenomena are described within different terms, and vice versa different aesthetic practices are subsumed under intermedia. The incoherence of naming points to a problem that lies within the phenomenon itself. In the context of Media Studies intermedia is a conceptual term that stands for processes indicating integration of structural elements that are specific to different media. The meaning of the concept is twofold: on the one hand it signifies a technical device and on the other hand referring to the technological dimension of both, cultural and media processes. Basically the processes of intermedia involve the activity of transformation and not of accumulation.

In summary, intermedia is a conceptual term. It should be applied in the first place to a specific type of transformation between different media. Secondly, intermedia indicates the structure of the transformation that is effected by a collision of elements taken from different media. Furthermore it is an aesthetic device to be identified in the media arts. To conclude: I suggest to use the term intermedia on three levels, that it is a transformation category, a structural term, and an aesthetic device.

THE [+] NET [-] OF DESIRE

I have just finished writing my third novel, *The [+]Net[-] of Desire*. My first book, *Correspondence*, 1992, was about the meeting of mind and machine, and *The [+]Net[-] of Desire* is about the meeting of mind and cyberspace. It is set at LambdaMOO, where an entire personality can be condensed into a sentence or two or even just a smiley icon :) The book has been incredibly difficult to write, and this is ironic because when I first started I thought it would be incredibly easy – so much rich material there, so many interesting people and interactions – although as I settled in I found myself reluctant to use real material, and now I feel very strongly that we should enjoy privacy in our virtual lives. But generally, it seemed to me that text-based virtuality could only equal Heaven. It is Fiction in action, happening on the spot. A player writes a phrase, and then another player takes the mental image and adds elements of their own to expand and construct it in rather the same way as we download a compressed file and use pkunzip or stufit expander to unpack it and make it active – except in this case we ourselves are also active in changing and contributing to the final product. In other words, we add our own preferences to the mindmix and make out of it whatever we will.

The problem that although virtuality engages our most intimate intellectual imagination, it is incredibly difficult to express that conjunction, that feeling of being logged on, to a reader who has never experienced it. How does one describe, for example, the intimate union of minds which occurs when you type a message to someone several thousand miles distant and you know, you just know, that you are linked to this person in some incredible and inexplicable way?

In *Correspondence*, I had made a small start with this in my attempts to imagine how it might feel to log on five years before I actually got the chance to experience it for myself. In 1989 I wrote:

"You love that feeling...! You hook in, and you want to stay there. You can feel the feather-duster tickle of digital switches clicking in your brain, and when the power is high they send frissons of electrical charge through your body like a series of impulse orgasms."

Well, the impulse orgasms were a touch of cyberoptimism, a disease which is still fairly rampant, but it's true that being logged on, being thus engaged, turned out to be a singular experience unlike any I have ever known. By 1996 I was able to write about it again in *The [+]Net[-] of Desire*, but this time with some authority:

"... she directs the flickering arrow onto the angular N of Netscape and double-clicks, She presses-then staring rapt at the screen as her pupils expand, her skin tightens, and her breathing quickens in anticipation. The red dot glows brightly as it searches for a starting point and... now!... connection is established. She glides forward into virtuality, her brain opening itself wide like a rolling summer sky in cinemascopia."

The beeps and clicks of her synapses tune in melodiously with the fast running machinemodem and together they sweep through the sea of information parting before them as they approach.

This is meat and electricity conjoined, as they should be, as they were designed to be, as they always have been.

Of course, this is a grossly optimistic exaggeration. It is a good example of the electronic romantic sublime, treating the phenomenon of cyberspace as if it were some kind of weather, or some emotional state, or some mystical atmosphere, rather than what it really is – a collection of bits of wire and plastic joined together by electricity. But I do think something new and strange is happening in cyberspace. I think that when we enter the world of machine-driven information we experience new and different sensations. The problem is that so far we seem to lack the conceptual lexicon with which to describe them. In everyday life we are accustomed to processing the data collected by the senses of touch, taste, hearing, sight, and smell, and indeed, without them we would have no way of knowing what is going on beyond the prison of our own skins, out there in the outside world. But the experience of cyberspace is different from that. It has created a new and complex phenomenon which, for lack of a better word, I have called the cybersensorium.

So how do we define the cybersensorium? To begin with, sight seems to be the predominant sense in cyberia – after all, one needs to be able to 'see' the screen. But whilst our eyes are obviously very useful, our reliance upon them can often prevent us from taking the imaginative leap necessary in order to enter virtuality. After all, the act of looking implies distance, detachment, objectivity – and often control. We depend upon it utterly. The predominant senses used to be touch and smell, but since Alberti formulated his technique of linear perspective in the fifteenth century, and since literacy became widespread, the western world has been enslaved by its own eye. Now virtuality is tugging us away from our safe and fixed position as immobile spectators in a visible world. *What you see is what you get* no longer applies here. One of the first lessons the novice cyberian traveller has to learn is not to believe the evidence of her own eyes. There is always more to discover than that which is revealed at any one time.

So let us leave the eye behind for a moment and turn instead to the third century theologian Origen, who identified a set of spiritual senses which twinned the physical ones and which facilitated the perception of transcendental phenomena such as the sweetness of the word of God. This doctrine of the five spiritual senses was seen as highly significant throughout the medieval period and subsequently gave birth to the idea of the "inward" sensorium (comprising memory, instinct, imagination, fantasy, and common sense) which acted as a processor for the data gathered by the physical senses. I venture to suggest that much of the thrill of cyberspace comes from stimulation of these "inward" sensoria – especially the calls it makes upon our memory, imagination, and ability to fantasise. We must accept that in virtuality, Descartes' five senses are no longer enough.

Technology does not necessarily push us into the future. Sometimes it loops us back into the past. When I was working on *Correspondence* in the late 1980s, and I told people I was writing a novel about nature and about computers, they laughed in disbelief at the notion that the two could ever hope to occupy the same universe. But in my work I was repeatedly mingling images of the organic with the inorganic, and when I looked for other writing dealing with the same experiences the nearest similarity I could find was in the work of a metaphysical poet from seventeenth century England – Andrew Marvell. His poem "The Garden" carried the abstract sensuality I'd been searching for. No matter whether it occurs beneath the heavy branches of a laden peach tree, or out in the swirling mindmolds of cyberspace, it is the same process in which imagination and reality bring us together to create and enjoy new shared realities. Describing the euphoria of stumbling through a richly-scented orchard, he notes how the heavily physical sensuality of the place provokes a parallel ecstasy in the mind:

*The Mind, that Ocean where each kind
Does straight its own resemblance find;
Yet it creates, transcending these,
Far other Worlds, and other Seas;
Annihilating all that's made
To a green Thought in a green Shade.*

(from *The Garden*, by Andrew Marvell, 1621-1678)

Here at last was the conjunction I'd been striving to discover. In his lyrical description of inorganic sensuality, Marvell had identified the buzz of a meeting of minds which would excite me and many others three hundred years later. Not, this time, in a garden hung with fruit, but in an infinite space replete with colours, abstractions and words. The following extract from *The [+]Net[-] of Desire* illustrates how I have tried to create my own interpretation of the "green Thought in a green Shade:"

Consider the virtual player sitting at the keyboard, eyes intent on the screen, fingers poised in thought, or rapidly typing. The only noises are those of breathing and of the CPU fan massaging the air.

Watch another, the lover of the first, as the body hardly moves, barely makes a sound, and yet inside that meaty shell blood courses through the veins, the heart races, the mind rushes on...

They are here and they are not here; they are in separate rooms but they are also together inside a binary labyrinth where their blood is changed into current, their arteries into wires, their brain activity into code.

Consider them as they concentrate, most of their major physical sensoria set to idle... their senses of taste, smell, hearing, touch all subdued and running in the background, whilst another set takes over, entering through the portal of their eyes and using only the medium of sight to trigger the pathways of the brain.

Cyberspace engages our most intimate intellectual imagination in a way never before encountered. Once accessed by sight, sound or touch, the computer bypasses the physical senses to hook us in directly and soon we are there

<< inside at last >>

finally released from the gridlock of meat and bone which has held us in thrall for so long.

For the purposes of the novel, I have replaced Marvell's garden with the landscape of virtuality and built a suite of rooms at LambdaMOO which form the location of the story and which can be viewed by anyone who cares to visit. (Room #87887 is the starting point). LambdaMOO is, of course, host to some very shallow and childish behaviour, but it is also a place of heady experiment where intense and unforgettable connections are forged. In the novel, I wanted to write about people who experience that meeting of minds and who are transformed by it. I wanted them to be enlarged and expanded by their experiences. I wanted them to understand that gender can be fluid, that identity can be a prison, that the body can be re-formed and re-inhabited in new and different ways. This sounds like a fantasy, but it is not. I have met people who have been transformed by virtuality, and I have met people who have been severely damaged by it. We might begin by trying to play at being virtual, but we soon discover that it is indeed a very serious game. I would like to end with a second short extract from *The [+]Net[-] of Desire*. One of the most powerful aspects of the cybersensorium

is that our relationships with others are hugely constructed from what we bring to them ourselves. Of course, flesh relationships are like this too, but what is special about virtual relationships is that they seem to involve a great deal of loving oneself. There is a powerfully onanistic element to them, especially with regard to the masturbatory elements of virtual sexuality, and I explore that in the extract which follows.

This is the point in the story when the main protagonists, two very ordinary people called Louise and Oliver, are startled to find themselves suddenly and intensely brought together. Their real lives are very different from each other, but in virtuality they have developed a number of new personas, and of these it is Louise's character Liis, and Oliver's character Obsidian, who connect so abruptly. At this moment in the story Oliver's elderly computer has just crashed and disconnected him. . .

He turns on the radio to calm himself, then leans across and jiggles the wire at the back of the computer, repeating the operation several times as the machine hisses and sputters until finally everything connects and the screen blinks its way to life. He starts to type. But now the machine screeches and screams in time to the electric guitars as the signals sing to each other from radio to computer and back again. He grits his teeth. His nerves are jangling with the noise, the bursts of static, the flickering light of the screen. He hits the off button on the radio and tries to concentrate.

Meanwhile, disappointed, and feeling acutely lonely, Liis has returned to the shady retreat of her own virtual room when Obsidian reappears.

"Hello!" she says softly. "I thought I'd lost you. . ."

He smiles.

"Oh no. . . just a small technical hitch."

"Good! I'm glad you're back!"

Silence.

Spasm

So what happens here now?

A shift.

A flux.

A dive.

For just a moment Obsidian hesitates, but something is happening that he can't ignore.

"kiss me. . ."

Oliver is frozen with emotion. Every nerve tingling, his penis thickening, his heart surging.

"kiss me. . ."

Louise stares at her fingers on the keyboard and imagines their twins, somewhere halfway across the world, typing exactly the same words at the same time.

Here they sit, embracing, but speaking not a word, until suddenly he finds himself whispering into the dark:

"I want you."

His words flicker their screens back to life.

"Yes," she murmurs.

She leans her head on his shoulder.

Louise is locked to the screen. Her brain is racing, her blood pounding through her veins.

In the space of just a few seconds, something has occurred here. There is a recognition, a patterning, a synchronicity which defies explanation and yet is almost tangible in the swirling air of cyberspace.

It is certainly tangible in Real Life, where Louise's fingers tremble against the keyboard, and Oliver's forehead shines with sweat.

In the many-gendered character of Obliv, Oliver has performed virtual erotics many times, but Liis feels like his first-ever lover. With her he is Obsidian, he is a virgin once more.

He leans back in his chair, pulls the keyboard onto his knees, and proceeds to make love to her slowly, tentatively, soaking her in, his hands caressing first the keys, then every part of his body in turn. He strokes the tender skin of his belly, his throat, the tightness around his eyes. He finds himself running a finger along the inside of his lower lip, twitching at it with his tongue, as if it belongs not to him but to his lover.

And Louise begins to understand how hollow are other pleasures compared to the joy of being so close to Obsidian, this consciousness so intimate with her own. She reaches out to touch the screen and traces the O of his name, longing to push her fingers inside him as if his whole body is an O, as if the only reason he exists is to encompass Louise and her hunger. Then patiently, gently, she finds in herself a strange and delightful newness.

It takes very little to fall in love in virtuality. But what causes it? There are no physical interactions, no sights, smells, or sounds, no pheromones, no body language. You cannot see or smell or touch each other. You can't hear your lover's voice or taste their lips.

Louise closes her eyes, opens them, and he is still here, his sentences running horizontally across the glass like a ribcage of desire containing only their two beating hearts.

Here, there are only words, words and electrons. That is all.

END

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Avatars on the World Wide Web: Marketing the "Descent"

Introduction

1995 was the year the Internet was opened to commercial use. The NSF officially stepped down and began planning Internet2, aimed at creating a network whose primary goal would be to facilitate research and education missions of universities in the US. It is envisioned that this network will be 100 to 1,000 times faster than the existing Internet. Applications like tele-immersion and digital libraries will change the way people use computers to learn, communicate and collaborate.¹ Although the universities are taking the lead in the initial development and research of this network, this is a collaborative effort between federal government agencies, private corporations and non-profit organizations. This means that it will probably be first accessible and tested in research institutions, then made publically available. Corporations such as IBM that have already invested in this venture are most probably having long term plans for the commercial potential of such a super fast network.

Opening the Internet to the public had meant opening Pandora's box, and there was no way anyone could even attempt to put a lid on the activities that were increasingly taking place. Conceptualized as having only machines "talking" to each other, its developers would have never guessed that this network of machines would transform itself into a network of humans using the machines. Exponential growth in the number of Internet users, the number of hosts connected to the World Wide Web, and the number of companies establishing a Web presence has created a gold rush mentality among firms and investors. This euphoria is largely fueled by electronic commerce, and many companies are putting significant resources towards figuring out the most effective ways of buying and selling everything from groceries to clothing to movies over the Internet.

What is particularly interesting about the commercialization of the net, however, is that it is largely being driven by yesterday's anti-establishment hippies and nerds, who have become overnight millionaires in the software industry. Many of these new powerful personalities (with the exception of the most powerful one) are bringing value systems influenced by eastern philosophies into the market while collaborating with established corporate structures. Perhaps caught between a dream and the mass market, it is interesting to look at how these seemingly opposite worlds are taking form. This strange interplay, perhaps contradiction, is best analyzed through our online selves in multi-user environments, also known as "avatars," a word that has now assumed a much narrower meaning than its original theological source.

Defining the "Avatar"

Before delving into analyses of how projects manifest themselves on the Internet, and what kind of implications they may have on the future on our perception of the marketplace, it may be useful to give an overview of the myriad definitions of the "avatar."

According to the Dictionary of Hinduism (1977), "Avatara" means "descent," especially of a god from heaven to earth. In the Puranas, an avatara is an incarnation, and is distinguished from a divine emanation (vyuha), both of which are associated with Visnu and Siva, but particularly the former. The avatara concept is probably a development of the ancient myth that, by the creative power of his Maya, a god can assume any format will, as did Indra. The avatara concept in Hinduism is a very complex hierarchical system with many different forms taking place.

Longman's Dictionary (1985) also defines avatar as the incarnation of Vishnu, a Hindu deity, and an embodiment of a concept or philosophy. The Oxford Dictionary, on the other hand, tells us that avatar can mean descent of a deity to earth in an incarnate form (i.e., as in "the fifth avatar appeared as a dwarf"), a manifestation or presentation to the world (i.e., the avatar of mathematics); a display, a phase (1990). If you refer to the Webster's Dictionary, it says that an avatar is a manifestation or embodiment of a person, concept or philosophy; a variant phase or version of a continuing basic entity. (1989). And finally, the Random House Dictionary describes an avatar as: "An embodiment or concrete manifestation as of a principle attitude, way of life, or the like" (1995).

In contemporary India, distinguished personalities may be called avatars, which is a sign that even at the source, the original theological meaning has shifted in popular culture. For instance, on the Web page of India Group, Partner Anil Srivastava refers to himself as "Anil Srivastava, avatar of global markets and emerging technologies, contemplates interactive media, networking, and online services from the omphalos of the Silicon Valley."²

If you ask anyone familiar with multi-user environments, the word simply means an assumed identity in cyberspace. But, the source of the use of the word in industry is a bit more difficult to identify. According to Peter Rothman, founder of Avatar Software and Avatar Partners (and later DIVE labs), "anyone claiming to know who used the word first, would be inventing the facts."³ Rothman and his partner found the word in the dictionary in 1982, simply liking Webster's definition: embodiment of a concept or a philosophy in a person. Appropriately, the debate about this came up on the WELL discussion forum about the origin of the word, in which Neal Stephenson claimed that he was first to use the term in *Snow Crash*, but since the novel was not published until 1992, this was not acknowledged. Generally, it is conceded that Randy Farmer and Chip Morningstar's "Habitat" was the first to use this term. They were inspired by the Hindu root of the word (Randall, 1995).

The avatar name is apparently very popular these days. Numerous companies have registered various versions of the name, usually by adding a word next to it. Some recent examples are: Avatar Partners – developing software for trading on the net; Avatar Holdings – a real estate developer of major resort, residential and recreational communities; and Avatar Systems – a moving company specializing in corporate relocations, just to name a few. The commercial world apparently has proprietary feelings towards the term. For example, at one point Avatar Partners were being threatened with a lawsuit by the Avatar Financial Associates who claimed to have been the first to have the name registered and trademarked. And then there is the Avatar nine-day course on "contributing to the creation of an enlightened planetary civilization." An enthusiastic testimonial on the net by a devotee claims: "I enrolled in the Avatar course in an attempt to alter behavior patterns that were interfering with the proper conduct of my business. Avatar taught me how to easily cast off the beliefs that were causing my problems... In addition, I found the Avatar experience to be delightful and amazing. My life is fuller, more meaningful and pleasant since I became an Avatar."⁴

Descent of the Avatar

The idea of the avatar "coming down" from an unspecified source in one of many possible manifestations connects well to the reverse hierarchy established originally by the scientific community at the inception of what would become the Internet: the client "uploads" to, and "downloads" from, the server that resides above.

The software industry's debate on avatars is really about object interactions passing between a variety of servers in real-time. Talking about avatars personalizes the discussion and brings up issues having to do with the nature of identity, security, interpersonal relations, and societies of the Internet.

The concept of an avatar can also be easily transferred to the many variants of computer messages and presentations being transferred from the Web to "client" computer screens. And, finally, all these concepts and hierarchies fit perfectly with financial markets used to trading numbers. The idea of products or services constructing themselves on a computer screen as a result of information "coming down" from the Internet and the World Wide Web is a very attractive prospect for entrepreneurs. There is a sense of power and control the owner of a server has, once removed from the flesh market.

What is particularly fascinating is how many are reading the mystical concepts of the word avatar into various software applications. For instance, Peter Small writes in the introduction of his online version of a book entitled *Magical Web Avatars*:

"The mystical aspect implies that the deity 'Vishnu' has no specific form or shape before manifesting as an avatar on earth. It is implicit that any physical appearance of an avatar is merely a temporary form or phase from an infinite variety of possibilities – a transient form from an indefinite, indefinable number of sources. It is the capturing of this concept, which makes the word avatar ideal for the purpose of describing the Web communication products which will be described in this book"

—Small, 1997

Thus product promotion is inextricably linked to mysticism and New Age values. This is true for many softwares with mystically encoded connotations, and for the marketing "gurus."

New Ageism typically encompasses an eclectic mix of different religious elements, claiming no allegiance to nationality or even specific Gods. Still, the strong ideological character remains, linked very much to cultural processes and marketing of products and ideas, and seems to be pervasive in the structuring of a significant number of new high tech corporations. Certainly, the very choice of naming an identity in networked spaces an "avatar" indicates this trend. The avatar in cyberspace represents a strange interplay of left-wing utopianism with right wing entrepreneurship, mixed up with esoteric spiritualism. New Age religion operates in tandem with networking technologies and "organic" corporate structures—the new "cool" companies that are emerging all over the high tech industry map.

James Hillman, a psychologist widely read by the corporate sector's elite, writes in his influential best-seller, *Kinds of Power*: "Economics is the only effective syncretistic cult remaining in the world today, our world's only ecumenical faith. It provides the daily ritual, uniting Christian, Hindu, Mormon, atheist, Buddhist, Sikh, Adventist, animist, evangelist, Muslim, Jew, fundamentalist and New Ager in

one common temple, admitting all alike..." (1995).

How perfect the Internet, then, to unite the multi-national corporations with their customers regardless of nation, race or creed. The multi-user environment with its dynamic design for instant communication and relations is the ideal space for the creation of communities with their various interests and markets, commercial or otherwise. Hence the World Wide Web, with its friendly graphical user interface – not like its predecessors, the text-based virtual realities, only accessible by the Unix literati.

To date, text based environments are still active with hundreds of thousands of users, and provide useful research data for those planning commercial ventures with graphical multi-user communities on the Web. Naturally, the graphical offspring promise numbers projected into the hundreds of millions (Advertising Age, 1996). There are over 500 MOOs (Turtle, 1995) in existence, with hundreds of thousands of users who might easily make a transition from the text based environments to more graphically designed spaces.

Hierarchies of Multi-user Environments

Examining the hierarchy of MUDs and MOOs is helpful if we are to begin understanding the evolving social structure of avatars in cyberspace.⁵ It is generally acknowledged that the Arch-Wizards are those who "own" the MOO, and that those new to the environment are usually guests who progress in their status as they become more active and experienced.

Most MUDs and MOOs prefer to allow users to retain anonymity so as not to destroy the online atmosphere by introduction of offline life. An exception to this would be MIT's MediaMOO, where each character has a "character name" and a "real_name."⁶ Real names don't normally appear, but can be seen with the @whois command. Only janitors (administrators of the MOO) can set or change real names. Because the goal is to enhance community amongst media researchers, you must provide a statement of your research interests in order to be granted a character. Regardless of the specialized purpose of the MOO, whether it is the most down-and-dirty fantasy dungeon and dragon MOO or a MOO steeped in theory, people in charge of the code reside at the "top."

For instance, *Avatar III – The Crypt*, is owned and run by a company in the UK that specializes in games.⁷ *The Crypt* is a beta site that presumably will become commercial as soon as enough players visit it regularly. When you first enter the site, you will get promotional materials – not at all enshrouded in fantasy – about the company that produces the MOO. The avatar inhabitants are – Shopkeepers, Moneychangers, Pawnbrokers, Pedlars, Town Guardsmen, Market Traders and Citadel Traders. The Avatar classes are very different, and guests are allocated to suit the skills of the different classes. The site's narrative and hierarchy uncannily resembles the class system England is so familiar with.

Rose, a user of the five year old MOO since day one, has gained the status of a god. She logs on daily to help newbies, and in this way gains points. One needs 1,000 experience points to move to the second level, and 1,024,000 to get to the twelfth and highest level. Gods have the power to move uplevels to ensure that the lower level gods can't force higher level gods to do things.⁸

Users are encouraged to help those on lower levels, which not only teaches human relations, but ensures a growing community. Thus the ones at the "top" assume a role similar to those held by religious figures of the past. By providing incentives they function as primary agents of socialization, and become more powerful in the process.⁹

Particularly interesting about *Avatar III* is that the role playing game is housed in a commercial shopping site – Silicon Village. Thus, an entire community is formed around the shopping site where users have the illusion of anonymity. The Arch-Avatars (owners), on the other hand, can easily track all the personal information they may need on users' likes and dislikes, newsgroup postings, favorite web sites, and navigational habits. As soon as users enter a site, it becomes possible to learn where they go, what they click on, their domain name, computer type, and general location. Personal information is fast becoming a most precious commodity, and those who are positioned as packagers and resellers of it will profit the most in the Information Age.

Descent of the Graphical Avatar

It is truly awe-inspiring to survey how much progress industry has made in figuring out ways to cash in on the potential markets of the World Wide Web. Star-featured chat rooms sponsored by large companies, soap operas, online trading, and role playing games seem to be the places where most success is promised. In other words, any space that could potentially form large communities that will regularly log on to communicate, exchange ideas and spend cybercash.

Avatar-filled chat rooms seem to be where most entrepreneurs are placing their bets. By the year 2000, chats are expected to generate 7.9 billion hours of online use, with a resulting \$1 billion in advertising revenue (New York Times, 1996). But makers of virtual environments predict that scrolling text for chat rooms will soon be replaced with 2-D and 3-D graphical environments, while marketers are busily exploring ways to exploit new technology for advertising.

For example, soap operas on the World Wide Web are seen as ideal environments for marketing strategies involving advertisements built into the narratives.¹⁰ Moreover, in contrast with television, there are virtually no standards regulating web-based advertising. Currently several cybersoaps allow advertisers the chance to have their products integrated into the story line (Advertising Age, 1996).

Meanwhile, **Rocket Science Games**, a maker of interactive entertainment software, and **CyberCash**, a company that handles payment transactions on the Internet, are forming a partnership to develop a virtual video game arcade on the World Wide Web. Scheduled for rollout later this year, **Virtual Arcade** will feature interactive versions of classic video games. Users will reportedly be able to modify the environments of the games, and they will pay as little as 25 cents to play each game. Payments will come out of an "electronic wallet" that users could replenish by transferring money from their bank accounts (San Francisco Chronicle, 1996).

Of course none of these developments would be taking place with this kind of speed if the WWW was a text-only environment. Although text-based MOOs and MUDs are still very active communities, and there will probably always be a place for them, the real gold-rush has started with the introduction of graphical user interfaces. Graphical Multi-User Conversations ("GMUKs") are something of a cross between a MOO and a chat room or channel. Rather than limiting users to text-only communications, as in most virtual chat environments, GMUKs add an audio-visual dimension that creates the illusion of movement and space.

The most popular GMUK, to date, is Time-Warner's *Palace*, a client/server program that creates a visual and spatial chat environment.¹¹ Currently, there are many Palace sites located across the Internet, varying widely in technical and artistic sophistication, as well as graphical themes. Jim Bumgardner and Mark Jeffrey created and designed The Palace at Time Warner's Palace Group. The software driving the environment was released in November 1995. More than 300,000 client versions have been downloaded since then, and over 1,000 commercial and private-hosted Palace communities have been established. Major investors include Intel, Time Warner, Inc., and Softbank. Companies like Capitol Records, Twentieth Century Fox, Fox Television, Sony Pictures, MTV (Suller).

Time/Warner's "avs," as *Palace* members affectionately call them, fall into two overall categories. The first are the standard set of "smileys" that come with the Palace program. These faces are available to all users, including unregistered "guests." The standard avs are associated with newbies, the unregistered guests who are considered a lower class of the Palace population. They have not paid the registration fee, they do not belong to the Palace culture, and are limited to wearing only the standard avs and props. They cannot create their own avatars, and are reduced to wearing a smiley which identifies them as a newbie. Only after paying the registration fee can the user unlock the prop-creating/editing feature of the *Palace* software. At that point they are able to choose from Animal, Cartoon, Celebrity, Evil, Real, Idiosyncratic, Positional, Power, Seductive or "other" avatars. The Palace is an excellent example of an environment in cyberspace that is a combination of an established entertainment industry's approach to pre-packaged programming for the public, reminiscent of developments such as Disneyland or any planned community.

Earth to Avatar

The biggest problem faced by industry in developing multi-user environments for avatars is the fact that people can assume many identities and are still quite difficult to track down. This is largely due to the lack of a universal standard allowing the avatars to move from one virtual world to another. There are a number of avatars currently on the Web—VRML, 2D, text, Voxel-drawn ones, and Virtual Humans (which refers to the group set up by VR News to exchange information about the development of autonomous agents that look like human beings).

Buying patterns, monetary exchange, security, and authentication must be maintained in the avatar in order for a market to be fully developed. Using standardized avatars can help in using Internet search engines for avatars and avatar properties. Finally, avatar companies have become common—they can price their avatars at a lower cost, make them available to more people and guarantee broader applicability.

In October 1996, at the *Earth to Avatar Conference* in San Francisco, architects of 3-D graphical interfaces on the web met to discuss the lack of avatar standards. When former Apple Computer Chairman John Sculley gave his analysis of the future of cyberspace at the conference, he said that once the technology is shown to work and standards are agreed, the big league players will move into cyberspace. As avatars become members of self-organizing groups, Sculley sees them as "a driving force shaping the economics of this industry" (Wilcox).

Universal Avatar Standards group stated that their core aim is to focus on the nature of avatars with regard to such issues as gender representation, ID authentication, personal expression versus social constraints, avatar versus world scale, and the communication of emotion. Macden Marvit, teleologist of Worlds in San Francisco, provides this overview of UA's approach:

"We are at a point in our industry where lots of companies are doing innovative things, both technically and artistically. The goal of UA is to allow users to move as freely as possible between the technologies and find the best experiences in each, while maintaining a consistent identity. So if Bernie moves from one "world" [developed using] one technology to another "world" in another technology, he can maintain his avatar's representation, his Internet phone number and his proof of identity" (Wilcox).

The proposal provides an architecture for managing thousands of geographically distant users simultaneously, with interactive behaviors, voice, 3-D graphics and localized audio. It uses a powerful concept known as "regions," which allows for multiple contiguous worlds, accelerated 3-D graphics, and efficient server/client communications. The avatar standards issue is crucial to the success of VRML as a commercially viable language. Until there is some common definition of an avatar, and universality of movement between spaces on the Internet, it seems unlikely that any VRML company can hope to make serious money.

The proposal discusses creation of a link to a user profile, coded in HTML and containing data the user wishes to be known either about his fantasy identity or a true one. Proofs of identity Vendor-specific extensions and user's history. A history could be with reference to games, for example, wizard status in a Role Playing Game (RPG), or it could hold marketing information about purchases made by credit card.

Conclusion

The Internet as it exists today is one large market testing ground—a living laboratory of sorts. It is clear that most companies are moving in the direction of developing multi-user communities with standardized avatars. Because standardization renders identity in fixed and accountable form, the connection between the users' physical self and bank accounts will not be confused. What will be confused by design, however, is the power status of the avatar—i.e., who is really the "user" and who the "used." In a paradox of power relations, the corporations practice their accustomed method of top-down hierarchy to lift lowly users into the avatar's "god sphere." Be as gods, the hidden god thus decrees; and it is technology and its invisible priests (those who control the servers) who are the real avatar of the god sphere. When the Internet "descends," and when avatars are standardized and cybercash perfected, we will be looking out upon a world that we can't even imagine, because it has been imagined for us.

NOTES

Special thanks to Alan Liu and Robert Nideffer for their suggestions during the revision of this essay.

1. Internet2—also known as I2—is a collaborative effort joining over 100 U.S. universities. See <http://www.internet2.edu> (Back)
2. <http://www.indonet.com/AnilSrivastava.html> (Back)
3. I interviewed Peter Rothman on December 31, 1996, at MetaTools INC. in Carpinteria. His company, DIVE, was acquired by MetaTools, and he is currently the director of Research & Development. (Back)
4. William L. Owens, Wisconsin, USA <http://www.epcnet.com/avatar/index.html> (Back)
5. MOO, technically, means MUD-Object Oriented. And MUD is a Multiple-User Dungeon (or Dimension). MUDs started as interactive adventure games similar to Dungeons and Dragons for the computer—but a version that participants could play over the Internet. Since those days, the use of MUDs have expanded to other sorts of games and to more social uses. The object-orientation of MOOs puts more of the programming focus on the "objects" that are in the MOO. Some of the most significant research done to date on MUDs and MOOs has taken place at Xerox Parc, University of Virginia and the MIT Media Lab. At Xerox Parc, Curtis Pavel established LambdaMOO and wrote on the social phenomena of Text-Based virtual realities (1992). (Back)
6. MediaMOO, <http://asb.www.media.mit.edu/people/asb/MediaMOO> To connect to MediaMOO from a UNIX host: telnet mediamoo.media.mit.edu 8888 (Back)
7. *Avatar III — the Crypt* - <http://www.avatar.co.uk/> (Back)
8. I interviewed Rose on May 29, 1997. In RL (real life), she works in a social security office. (Back)
9. An example of a code of conduct in an online game can be found at: http://games.world.co.uk/code_of_conduct.html (Back)
10. Online soaps include:
The Spot: <http://www.thespot.com>
Ferndale: <http://www.ferndale.com>
Techno 3: <http://www.bluepearl.com/bluepearl>
The East Village: <http://www.theeastvillage.co>
(Back)
11. The Palace Home Page — <http://www.thepalace.com> (Back)

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