PROCEEDINGS

COSIGN 2002

2nd Conference on Computational Semiotics for Games and New Media

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Preface

This is the second COSIGN and again we provide a cross-disciplinary space to explore the ways in which semiotics (and related theories such as structuralism and post-structuralism) can be applied to creating and analysing computer systems. Like in the previous year we decided to mix academic papers and artistic presentations – yet still allocating enough time for vital and vibrant discussions. We hope that at the end of the three days the attending computer scientists; HCI and AI practitioners; designers of computer games and interactive entertainment, digital artists and poets, critics, semioticians, and narratologists have a better understanding of computational semiotics and perhaps depart with the anticipation for COSIGN 2003 in Visby, Sweden.

Producing a conference requires the effort of many individuals. We would like to thank all the people who volunteered their time and talents in support of COSIGN 2002; the members of the programme committee and the new media artworks committee, the authors of the papers gathered in these proceedings, and those at the Universität Augsburg who helped us in making Augsburg the right location for COSIGN 2002.

We are in particular most grateful to Frau Brigitte Waimer-Eichenauer, who heartily managed the whole administration. We wish to express our gratitude to Douglas von Roy for providing the technical support. Our special gratitude to Sabine Bein and Peter Rist who designed the cover and logo for COSIGN 2002. Many thanks also to Gesellschaft for Informatik (GI) and ACL SIGMEDIA for their support.

A conference also requires an operating budget, which in case of COSIGN 2002 is funded partly by registration fees. However, through the generosity of the Universität Augsburg the conference was able to moderate registration fees while providing the appropriate environment and organisation for this conference. We gratefully acknowledge this support.

Finally, we would like to thank the participants of this conference because without you no stimulating interaction would be possible.

Elisabeth André, Andy Clarke, Clive Fencott, Craig Lindley, Grethe Mitchell, and Frank Nack

Keynote Speaker

Jeff Rickel

BIO

Jeff Rickel is a project leader at the University of California's Information Sciences Institute and a research assistant professor in the department of computer science. He closely works with the USC Institute for Creative Technologies. His research interests include intelligent agents for education and training, especially animated agents that collaborate with people in virtual reality. Previously, at the University of Texas in Austin, his dissertation research addressed the problem of automatically constructing mathematical models of complex systems to answer prediction questions.

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TITLE Virtual Humans for Interactive Stories

Virtual Humans for Interactive Stories

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Good stories with engaging characters capture our imagination and provide memorable experiences. However, traditional media such as theater, film, and books limit our ability to participate in the story. In contrast, computers offer the potential of virtual worlds where people can be active participants in stories, interacting with computer-generated characters - virtual humans - in real time. Current computer graphics technologies can produce vivid 3D worlds with realistic-looking virtual humans. Coupled with speech recognition and speech synthesis, these virtual humans could support face-to-face interaction, including the wide variety of facial expressions and body language through which we communicate. As we move from desktop computers to high-end virtual reality, the experience becomes even more compelling.

Such interactive virtual worlds provide an exciting form of entertainment, and they also offer a powerful platform for experiential learning. Simulation-based training has been used successfully for many years in areas such as pilot training, but the addition of compelling stories with interactive virtual characters opens up many new possibilities. For example, a young army lieutenant could be prepared for a peacekeeping mission by putting him in virtual Bosnia and presenting him with the sorts of situations and dilemmas he is likely to face. In such scenarios, virtual humans could play a variety of roles, such as an experienced sergeant serving as a mentor, soldiers serving as his teammates, and the local populace. Unless the lieutenant is truly drawn into the scenario, his actions are unlikely to reflect the decisions he will make under stress in real life. The effectiveness of the training depends on our ability to create engaging, believable virtual humans that respond appropriately as the scenario unfolds in response to the lieutenant's actions.

Building such virtual humans will require fundamental advances in artificial intelligence. They must perceive and respond to events in the virtual world. They must construct and revise plans in coordination with other characters (both humans and virtual humans). They must have and express realistic emotions. And they must be able to carry on spoken dialogues with those other characters, including all the nonverbal communication that accompanies human speech (e.g., eye contact and gaze aversion, facial displays, and gestures). While there has been work on all these individual components within the artificial intelligence community, no previous effort has tried to integrate the state of the art in each area into a single virtual human architecture, and to deal with the complex interplay among them.

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We are addressing these requirements in an ambitious project called Mission Rehearsal Exercise (MRE) [Swartout et al. 2001]. In addition to our basic research on virtual humans, we implemented a peacekeeping scenario as an example application to guide our research, as shown in Figure 1. The human user plays the role of an army lieutenant faced with a difficult dilemma: whether to continue on with his original mission or stay and help a local boy who was injured in an accident with one of the lieutenant's vehicles. The system displays the visual scene on an eight-foot-tall screen that wraps around the user in a 150-degree arc with a 12-foot radius. Immersive audio software uses 10 audio channels and two subwoofer channels to envelop the user in spatialized sounds that include general ambience (such as crowd noise) and triggered effects (such as explosions or helicopter flyovers) [Kyriakakis 1998]. We render the graphics, including static scene elements and special effects, with Multigen/Paradigm's Vega. The simulator itself—or a human operator using a graphical interface—triggers external events, such as radio transmissions from other platoons, a medical evacuation helicopter, and a command center. Three intelligent virtual humans interact with the user: his platoon sergeant, his medic, and the mother of the injured boy. All other virtual humans (a crowd of locals and four squads of soldiers) are scripted characters implemented in Boston Dynamics' PeopleShop. The lieutenant talks with the sergeant and medic to assess the situation, issue orders (which the sergeant carries out through the four squads of soldiers), and ask for suggestions. The lieutenant's decisions influence the way the situation unfolds, culminating in a glowing news story praising his actions or a critical news story exposing decision flaws and describing their sad consequences.

Early work on embodied conversational agents [Cassell et al. 2000] and animated pedagogical agents [Johnson, Rickel, & Lester 2000] has laid the groundwork for face-to-face dialogues with users. Our prior work on Steve [Rickel & Johnson 1999; Rickel & Johnson 2000; Rickel & Johnson 2002], shown in Figure 2, is particularly relevant, serving as the foundation for our virtual humans. Steve is unique among interactive animated agents because he can collaborate with people in 3D virtual worlds as an instructor or teammate. Steve supports many capabilities required for face-to-face collaboration with people in virtual worlds: he perceives the virtual world via messages from other software components (e.g., speech recognition, the simulator, and the virtual reality software), constructs and continually revises plans, maintains a collaborative dialogue with his student and teammates, and uses his body to move around the virtual world, demonstrate tasks, and communicate with others. His behavior is guided by a set of general, domain-independent capabilities operating over a declarative representation of domain tasks. We can apply Steve to a new domain simply by giving him declarative knowledge of the virtual world—its objects, their relevant

Figure 1. An interactive peacekeeping scenario in the Virtual Reality Theater at the USC Institute for Creative Technologies

simulator state variables, and their spatial properties—and the tasks that he can perform in that world [Rickel & Johnson 1999].

Steve's original capabilities are well-suited for training people on complex but well-defined tasks, such as equipment operation and maintenance. However, interactive stories like the peacekeeping scenario introduce new requirements. In the MRE project, we are extending Steve in several key areas: more human-like perceptual limitations, a more realistic body and associated animation algorithms, more sophisticated spoken dialogue capabilities, and emotions [Rickel et al. 2002].

Like many current virtual humans, the original version of Steve had no perceptual limitations: he had access to all changes in the virtual world via messages from the simulator, regardless of his location or attention state. Without a realistic model of human attention and perception, we had no principled basis to limit his access to this information. In the MRE project, Randall Hill and his colleagues have integrated a more realistic model of both visual and aural perception into Steve, based on Hill's earlier work on perception for simulated fighter pilots [Hill 1999, 2000]. Their extensions to Steve include algorithms for determining the location of objects in the environment and encoding this information in a cognitive map [Hill, Han, & van Lent 2002].

Steve's body has also received a make-over. While the original body could generate all his movements dynamically using an efficient set of algorithms, its graphical model and repertoire of behaviors were too limited for creating believable characters for interactive stories. Fortunately, Steve was designed to allow a new body to be plugged in without affecting his other modules. Research in computer graphics has made great strides in modeling human body motion, including methods such as forward and inverse kinematics that provide flexible real-time control, methods that use motion capture and keyframe animation fragments to produce more realistic motion at the expense of less real-time flexibility, and recent approaches that are beginning to combine the best of both approaches. For MRE, we integrated new bodies by Boston Dynamics Incorporated (BDI) and expressive faces from Haptek Incorporated, as shown in Figure 1. While the BDI software primarily supports dynamic sequencing of motion capture fragments, they have extended their animation algorithms to give us more real-time flexibility, primarily in the areas of gaze and gestures, thus leveraging the realism of motion capture while providing the flexibility of procedural animation [Rickel et al. 2002].

Spoken dialogue with virtual humans is crucial for interactive stories. However, current computer games provide characters with little or no ability to converse with human users, except through canned utterances. An ability to carry on face-to-face conversations with virtual humans may provide the most compelling advance over current commercially available software, making virtual worlds far more engaging and interactive. The original version of Steve could converse with users using speech recognition and speech synthesis; however, like most embodied conversational agents to date, his natural language understanding and generation capabilities fell far short of the state of the art in computational linguistics. In the MRE project, a number of people have contributed significant extensions to Steve's spoken dialogue capabilities, which now include the following:

- A domain-specific finite-state speech recognizer with a vocabulary of several hundred words, allowing recognition of thousands of distinct utterances, even in the presence of all the noise (e.g., from the crowd, explosions, and a helicopter) in our peacekeeping scenario
- A finite-state semantic parser that produces partial semantic representations of information expressed in the text strings returned from speech recognition
- A dialogue model that explicitly represents aspects of the social context [Traum 1994; Matheson, Poesio, & Traum 2000] while supporting multi-party conversations and face-to-face communication in 3D virtual worlds [Traum & Rickel 2002]
- A dialogue manager that recognizes dialogue acts from utterances, updates the dialogue model, and selects new content for the virtual human to say
- A natural language generator that can produce nuanced English expressions, depending on the virtual human's personality and emotional state as well as the selected content [Fleischman & Hovy 2002]
- An expressive speech synthesizer capable of speaking in different voice modes depending on factors such as proximity (speaking or shouting) and illocutionary force (command or normal speech)

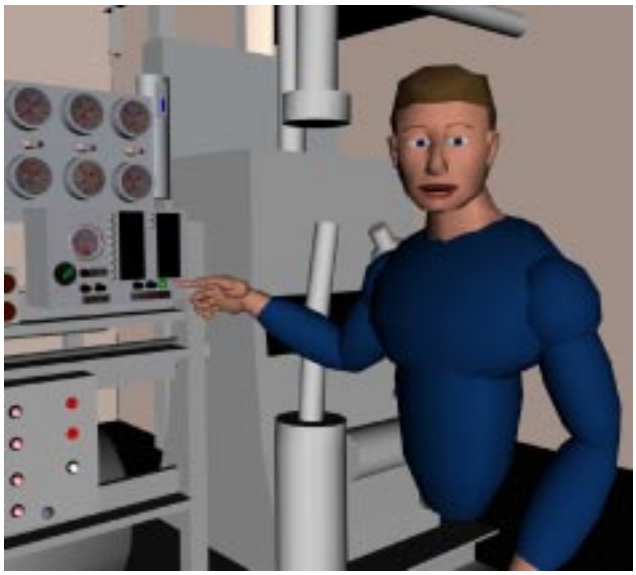

Figure 2. The original version of Steve (prior to the MRE project), explaining an indicator light

Emotions are an important aspect of human behavior and may be the most critical element in creating engaging characters and stories [Thomas & Johnston 1981]. The original version of Steve had no emotions, making him unrealistically rational as a teammate and uninteresting as a character. Fortunately, research on computational models of emotion has exploded in recent years. Gratch's work on task-related emotions [Gratch 2000] and Marsella's work on social emotions [Marsella, Johnson, & LaBore 2000] are especially relevant to our goals. Gratch and Marsella have integrated their models into Steve and significantly broadened their scope [Gratch & Marsella 2001; Marsella & Gratch 2002]. Their work is motivated by psychological theories of emotion that emphasize the relationship between emotions, cognition, and behavior. In their model, an appraisal process results in an emotional state that changes in response to changes in the environment or to changes in the virtual human's beliefs, desires, or intentions. Verbal and nonverbal cues manifest this emotional state through facial displays, gestures, and other kinds of body language such as fidgeting or averting gaze. These emotions trigger coping mechanisms that motivate the virtual human to discharge strong emotions by changing the factors that contributed to them, either by changing the state of the virtual world through action or revising internal beliefs, goals, or intentions. For example, the sergeant in our peacekeeping scenario feels guilty because he is partially responsible for an action with an undesirable outcome (the boy is injured); he can cope with that emotion by reversing the undesirable state (e.g., by getting treatment for the boy) or by shifting blame. Appraisal and coping work together to create dynamic external behavior: appraisal leads to coping behaviors that in turn lead to revised appraisals of the virtual human's situation.

Through the MRE project, we are exploring the integration of a broad set of state-of-the-art capabilities to create believable, engaging virtual humans for interactive stories. Although there has been extensive prior research on each of these capabilities, we cannot simply plug in different modules from separate research communities; researchers developed the state of the art in each area independently from the others, so our fundamental research challenge is to understand the dependencies among them [Rickel et al. 2002; Gratch et al. 2002]. Our project follows in the footsteps of the pioneering work of Bates and his colleagues, who argued that believable agents must have a broad range of capabilities [Bates, Loyall, & Reilly 1992]; however, while they worked toward broad but shallow agents, we are aiming for both breadth and depth, which is required for the class of characters and stories we are targeting. While our goals are ambitious, the potential payoff is high: virtual humans that support rich interactions with people pave the way toward a new generation of interactive systems for entertainment and experiential learning.

ACKNOWLEDGMENTS

The MRE project is funded by the Department of the Army under contract DAAD 19-99-D-0046. I would like to thank all my colleagues who are contributing to the project. Bill Swartout serves as the overall project director. Shri Narayanan leads a team working on speech recognition. Randall Hill, Mike van Lent, Changhee Han, and Youngjun Kim are working on perception. Ed Hovy, Deepak Ravichandran, and Michael Fleischman are working on natural language understanding and generation. David Traum is working on dialogue management. Jon Gratch and Stacy Marsella are working on emotions. Lewis Johnson, Kate LaBore, Shri Narayanan, and Richard Whitney are working on speech synthesis. Marc Raibert and Adam Crane lead a team at Boston Dynamics working on human figure animation. Kate LaBore is developing the behaviors of the scripted characters. Larry Tuch wrote the story line for our current scenario with creative input from Richard Lindheim and technical input on Army procedures from Elke Hutto and General Pat O'Neal. Sean Dunn, Sheryl Kwak, Ben Moore, and Marcus Thiébaux created the simulation infrastructure. Chris Kyriakakis and Dave Miraglia are developing the immersive sound effects. Jacki Morie, Erika Sass, Michael Murguia, and Kari Birkeland created the graphics for the Bosnian town. Any opinions, findings, and conclusions expressed in this article are those of the author and do not necessarily reflect the views of the Department of the Army.

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Keynote Speaker

Ola Stockfelt

BIO

Ola Stockfelt is lecturer in music and moving image at the Göteborg University and at the University College of Skövde, Sweden. He's a doctor and docent in Musicology - his dissertation on *Music as the Art of Listening* dealt with the changes in listening strategies in different context since late 18th century up to the 1980's. He has done extensive work in the area of soundscape studies, background music and sound design, and is presently primarily teaching in the areas of music and sound in film, television and different computer contexts.

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TITLE

"The Importance of Being Audible" Conventionalized Sounds in Virtual Worlds – Audio Semiotics

“The Importance of Being Audible”
Conventionalized Sounds in Virtual Worlds - Audio Semiotics

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INTRODUCTION: I AM — THEREFORE I SOUND

Every movement through a medium creates sounds. Every human action is also a production of sounds. If you don’t intend to make sounds, if you don’t count with the making of sounds as an integral part of the action, you do instead create un-intended sounds. Thus, the world is full of sounds, and most of them are un-intended.

During pre-industrial times, most sounds, and all sounds created by man, were sounds of kinds to which the human organism had had enough time to adapt. The human organism is amazingly competent in recognizing and handling a great variety of sounds – and is dependent on this handling of sounds in order to function optimally. In fact, sounds and movements are for obvious reasons the only two media we do learn to perceive and handle in an adequate way even before birth, and that actually transcends the moment of birth. The new-born child is already relatively sophisticated in recognizing sounds, and reacting to sound input. The prenatal proto-identity consciousness of being is related to sound and movement, and these senses are thus paradigmatic for the infants postnatal learning of how to handle the input suddenly added through the other senses — sight, taste, temperature… etc. — of the whole non-optional multi-sensory reality of human existence.

This has a problematic side-effect: while we as human beings in our daily lives are totally dependent on being completely amazingly competent in the adequate perception and analysis of a multitude of simultaneous sounds of the most widely differing proportions and origins, at the same time we have an extremely low reflexive consciousness of the qualified work we do perform while handling these sounds. We do know what meanings different sounds convey, but we seldom know how and why we know. We are usually not even actually conscious of performing advanced cognitive work while analyzing the sonic aspects of perception. We might for example ”see” that a surface is hard, since we’ve heard a ”hard” sound in connection to it – and place the consciousness of our perception solely in the visual sphere.

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The meaning of *some* categories of sounds are – probably – somehow hard-coded in our genetic makeup. There are a few types of sounds that the body seem to react involuntarily to in a rather consistent manner no matter what – like excessive persistent base drones, sudden rises in amplitude etc. But even the meaning of highly conventionalized sounds might appear to us as ”natural” — because of the combination of a high degree of sophistication in perception and a very low level of reflexive consciousness that is the standard in our relationship to sound input. The meaning of sounds thus might appear as ”mystical” and slightly uncanny, and therefore also hard to handle in a practical manner – especially if you for some reason might need or want to deviate from the ”natural”.

This situation makes for a close mix between those meanings of sounds that are indeed conventionalised, and those that are (or might well be) “hard-coded” in our genetic make-up – especially since the ”hard-coded” sounds have been one of the conditions for the formation of the convention. And since most of the conventionalised meanings of sounds used in communicative situations today go back several centuries, or more, within our dominant culture, it’s actually a practical impossibility to sort out what sounds, and what aspects of sounds, that have meanings that are thus “hard-coded”. But either way, and for just that reason, they can all be studied, and handled, as parts of a complex of conventionalised sounds – as a sort of “language” if you will.

That’s why semiotics often come in extremely handy when you deal with sound — whether these sounds might be called ’music’ or not.

THE CULTURAL SOUNDSCAPE

The industrial soundscape has brought a reduction in the number of ”natural” sounds we can use in order to orient ourselves. The soundscape has gotten ever louder, and has long ago gotten up to amplitudes that are making definite irreversible damage to the human organism, but the number of discreet sound events usable for orientation and action has actually been reduced. Some sounds have been completely excluded from urban environments by city planning and architecture. Most sounds are still there, but are being constantly drowned by other sounds which the human organism is quite poorly fit to process. They can thus no longer be percieved and used as means for information, for orientation, for confirmation of actions and identities, etc.

The urban soundscape, the cultural soundscape of human civilization, is almost completely made by man (it is what Murray Shafer calls a ”macrocosmic music composition”), and therefore it

could, and should, be even more suitable for the human organism than the ”natural” soundscape to which life once had to adapt — just like sleeping in a bed is more comfortable than sleeping on the ground or in a tree. But it’s not, and the reason is of course that almost all the sounds it consist of are un-intended, dis-regarded, un-wanted — as side effects of other activities.

The actually intended sounds thus has had to contest with the multitude of unintended sounds in order to be perceptible and functional – both in production, transmission and reception. You can actually get a fairly good measurement of the historic changes in the urban, and lately also rural, soundscape by studying the changes in design of sounds that have had to be heard above the general turmoil, and in the construction of specific separate exclusive spheres intended for the perception of some comparably soft sounds regarded to be of special importance to resourceful groups.

Specific sounds has thus designed in order to fill a variety of functions in relationship to activities being performed in the cultural soundscape. Some of these functions were earlier filled by the sounds that became ”naturally” produced by the very performance of the intended action – like ringing a door bell for announcing that you’re coming visiting, or putting on the police siren when you start the hunt. These are the ”small” sounds that are usually un-intended, but still expected and crucial for the performance of the action, and the confirmation of a successful performance.

The sounds that has been intentionally produced, like speaking, singing, making rhythms etc., have been adapted to the changing circumstances. Chatting with close friends in a quite rural setting, yelling at the market, shouting greetings in a hard trafficed urban street — the singing of a lullabye in a silent setting demand a different quality of voice than performing in a street corner, or singing in a hard rock band.

When the ventilation system in a building suddenly shuts down, you might find that what you had experienced as a private chat in a quite, confidential voice, actually consisted of yelling rather loudly at each other. A change in the context immediately redefines the meaning of the components, like the quality of the voice.

THE VIRTUAL SOUNDSCAPE – THREE COMPLEMENTAIRY SIGN SYSTEMS

The conventionalized nature of even the sounds that might appear as “natural” is especially obvious in the sounds created for different forms of virtual environments, and especially such framed non-interactive virtual environments which has been created to constitute separate, alternative worlds or mirror worlds to the one of daily existence. The historic, paradigmatic form here is the opera. Particularly after the opera went commercial, through the invention of the entrance ticket in the late 1630’s, a roster of music formulas and sound effects were conventionalized into a mainstream sonic sign system that could be used to communicate a variety of specific meanings to heterogenous audiences whose only common denominator was that they had in each instance bought a ticket. The opera subsumed all functioning sonic sign systems of the then dominant cultures, and included them into the repertoire of stereotyped communicative signs — it even included the existing conflicts between different sign systems as a level of stereotyped communication. It also developed new stereotypes particular to the new situation of framed non-interactive representation, including relations between representation in music, words, gestures, staging, etc. The operas enormous public and commercial success in the 17th and 18th centuries made its means of communication the obvious fundament for other forms of music and drama. That’s why what was “the new thing” in the 17th century might be an obvious basis for all kinds of music in the 18th century, a “universal language” of building blocks for programme music, home music, theatre and music drama in the 19th century, and in the 20th century be evidently understood by all when it appeared in film music, in mood music catalogues and in computer games. The same old clichées still work amazingly well.

But while the old signs still function and still form the basis of audiovisual communication, a couple of other, equally important sign systems have been added during the 20th century, due to the possibilities of mechanical reproduction of sound.

The first of these systems is the “real sounds” of sound movies. There are no real sounds in the film – all sounds are conventionalized in order to tell the story in the most effective way. How to create sounds that sounded “real” was a matter of much debate in the 30’s – many thought that you should use the “true” sound of a single microphone placed by the camera in order to give an acoustic perspective that was not in conflict with the visual perspective. But it didn’t work out. Partly because you always have to tell more, and less, with the sound in a film than what the “real” situation will offer, partly because no microphone or reproduction system in the world could, or can, emulate the human ear (no matter the claims from the sellers of sound systems). Just recording and replaying a gun-shot, a kiss or a slap in the face won’t do the job – the recording doesn’t get the sound right, and even if it did, it wouldn’t convey the narrative meaning of the events. In practice, the “real” sounds on film became as conventionalized and stereotyped as the musical signs. Like all effective and widely used sign systems, this has been developed into conventions that we tend to take for granted, and that we might even mistake for the “natural” sounds of the world.

The stereotyped conventionalized sounds of film and television, rather than the sounds of the “real world”, has constituted the basis for the even more stereotyped sounds of information and feedback in computer environments.

The other sign system becoming prominent through the mechanical reproduction of sound in the 20th century is the system of social identities confirmed and announced by different genres of popular music. Popular music (including genres as “classical”, “etno”, etc.) is one of the most widely known methods to distinguish a persons, or an environments, cultural and/or sub-cultural basis. As background music in public environments it contributes to inform us what kind of social behaviour is regarded as fit in different setting, and thus indirectly who is welcome and who is not. As background music at work, or in our homes, it provides a quick customization that makes the environment fit our needs to feel at home and comfortable. As music in film, or computer games, it can give an immediate quick identification of types of character or environment. Most sub-cultures in our society thus has special areas where the music informs us that their values, their identities, their preferred ways of social conduct, is the norm to which you should adapt – or get out -, be it concert halls, churches, hotels, restaurants or jeans stores. Those who has no specific space has to create them in the public environment by carrying around getto blasters. A powerful sound

system in the car announces your power to the world through which you might choose to drive. I sound – therefore I am. Thus, in daily practice, we reinforce the conventions of identifying stereotypical social behaviour by equally stereotypical genre codes – playing the “wrong” kind of music in the “wrong” setting is a sure sign of either cultural incompetence or strong provocation.

It is less risky, and even more common, to bring your personal customized musical soundscape with you in ear plugs.

These three sign systems – the music-dramatic stereotypes, the conventionalized narrative representation of “real” sounds and the social codes of genre conventions – are usually used together in most fiction film, edutainment, computer games or computer desktop interfaces, with complementary functions. It can still be valuable to view them as three different systems, since in practice they do work in slightly different fashions. This is where a semiotic analysis can come in constructively.

In interactive multimedia computer environments, a number of rather special regards due to specific conditions also apply, which limit and influence the use of available sign systems:

- All sounds within computer activity are embedded in other soundscapes, and in other activities.
- What we often to call multimedia is actually a state of severe sensory deprivation.
- All computer sounds must almost always be optional.
- Most computer sounds must almost always be customizable.
- All computer sounds must be fit to enter into a constructive pedagogical process.

And on this I intend to elucidate today.

PAPER

COSIGN 2002

The Emergence of the Labyrinth, the Intrinsic Computational Aesthetic Form

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This year marks a noticeable evolution in our understanding of computer based media, as reflected in the papers and artworks of the COSIGN conference. Our commentary for COSIGN 2001 focussed on the tension between old and new languages, the reiteration of old media in the metamedium of digital systems being juxtaposed with the emergence of and search for forms specific to digital technology as a medium in its own right. This tension provided a thread by which we could weave together the topics and themes of the conference. This year we see a clear focus on new form, and the utilisation of the active, procedural, creative and generative features unique to digital media. Artistic strategies adopted range from celebration of the reflexive and recursive structures of digital media, to disruption of the established dominant and commercial forms based upon those structures (computer games, the web, and immersive VR systems).

It is interesting to observe how our discourse has progressed beyond recent debates about the role of narrative (in opposition, for instance, to gameplay). Rist's et. al paper "CrossTalk: An Interactive Installation with Animated Presentation Agents" explores a meta-theatre metaphor as the basis of discourse in public spaces allowing agents to live beyond the actual presentation, as professional actors, enriching the interactive experience of the user with unexpected interludes and rehearsal periods.

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The agents' repertoire allows conveying certain rhetorical relationships in canonical manner and thus providing a role play between several characters that not only communicates information to the audience but also invites the user to barge-in the ongoing free-floating conversations.

Alberti, Maggiorini, and Trapani's paper, "NarToo: A Tool Based on Semiotics to Support the Manipulation of a Narrative", presents a system designed for someone destructuring a textual narrative before producing a new story in a different medium. Given the logical sequence of episodes of a narrative, modelled using a method based upon Greimas' narrative theory, the goal is to obtain different plots expressed in multi-modal language. While the intended product is a traditional linear narrative, and irrespectively of its authors intentions, the tool itself implicitly depends upon the subversion of narrative form facilitated by digital technology; the producer is a kind of reader engaged with the non-linear narrative potentials of the material.

Szilas' IDtension system, described in the paper "Structural Models for Interactive Drama", embraces the dissolution in seeking the generative basis of narrative as the product, rather than any specific predefined narrative. The goal of this work is to find a procedural model of drama in order to simulate it. Bremond's narrative theory (together with Todorov's narrative transformations) splits narrative into more than fifty processes that modify narrative roles. IDtension uses a narrative logic based upon this theory, involving tasks, obstacles, actions and characters. A narrative sequencer is also used, together with an audience (user) model of narrative-related emotional and cognitive needs. The computer is then able to model the (structuralist) atemporal structure of drama,

and then simulate this structure in order to unfold the chronological sequence of events. Narrative in this case is stripped to its generative basis, and there are no predefined narrative sequences. Instead, linear narrative emerges as a product of interaction, and can only be found in its final form when interaction is over (echoing Pasolini's biographical problem, discussed by Johansson).

From here we depart from any non-ironic concerns with narrative, and almost from narrative altogether. The last traces of narrative concern are found in Condon's disruption of computer games and in the linear structure of Amagliani's web-based artwork "One Way" (http://rhizome.org/object.rhiz?2590). One Way is a narrative only in so far as it presents an unchangeable linear pathway through disrupted web images. The structure of One Way leads the viewer through various ironic ways of traversing from one step to another of its mock web structure, presenting distortions of familiar web experiences along the way, and confounding (and thereby foregrounding) the habitual browsing process.

Condon's work represents a strongly reflexive and ironic stance towards established computer game form, each piece being "a meditation on dysfunction and its relationship to contemporary culture". Condon's White-Picnic-Glitch consists of twelve conversions of the very popular commercial computer game "The Sims". Each section of White-Picnic-Glitch portrays aesthetically mutilated characters performing repetitive, useless or indescribable actions. Glitcht presents a fractured, non-representational space. Condon describes the work as a cross between fan art and a traditional visual arts product (i.e. dysfunctional narrative). Chinatown presents twitching 3D portraits of friends aimlessly wandering around a model of Las Angeles' Chinatown, a comment upon gentrification, among other things. Adam Killer presents a hoard of the same character with trailing visual effects arising from an editor fault, in predominant initial white to highlight the red of destruction created by the player's virtual violence. Worship uses scripting within Anarchy On Line, a massively multiplayer on-line role-playing game (MMORPG), to create an avatar that worships the player, writing "I worship you" and "Worship me" to create a sense of destabilised identity. Gunship Ready is a project in which a Tribes 2 transport ship is used to kidnap a group of warriors (controlled by on line players) and take them, not to the war zone as desired, but on tour of the landscape, forcing them to suicide in order to respawn and return to the battle site.

Disruption and the formation of an ironic avant-garde in digital media critically depend upon the consolidation of its commercial form and the reflection of dominant culture within that form. Johansson ("The New Image: On the Temporality of Photographic Representation after Digitalization") describes how strict diegetic Hollywood montage in the early 1940s was the foundation from which film art experienced the liberation of the shot, leading via Italian neo-realism to the new wave cinemas of Europe and the USA. In a similar way, the established forms of the web and of computer games provide a departure point for reflexive and exploratory works in web and game form and their underlying technologies. This new (digital) avant-garde has essentially two thrusts (as have previous avant-garde's in the history of art), one concerned with irony and reflexivity in relation to dominant media, and the other being concerned with ongoing formal development beyond the constraints of dominant media structures.

Kim Boekhout van Solinge's "Distortion Simulator" is another ironic piece, this time directed at the form of immersive 3D virtual reality systems (http://www.hai-tek.nl/cosign2002.html). Distortion Simulator inverts the whole principle of immersive VR, involving a Caravan-based installation that attempts to recreate the experience of video snow physically by bombarding the audience with rubber balls, turning virtual reality into real virtuality. Walz and Poultney's work, described in "Container Love: Performing the Body Electric", takes a broader stance of ironically dealing with our relationship with technology in general, asking how it is that we are in love with our prosthesis, and parodying our relationship with technology in the form of a very human love affair.

Other works in the COSIGN exhibition combine irony with a more formal reflexive stance, of a kind analogous to Takahiku Iimura's analysis of the structure of seeing and video representation in the work "Observer Observed" (http://www2.gol.com/users/iimura/OB-OB.html). Dane's work encompasses ironic mimicry of web-based e-commerce ("Hands", http://machinecorporation.com/hands/), and hypertext poetry investigating themes including masculine gender. Irony and new form are more intrinsically merged in the "Subvergence" (http://www.subvergence.net) series by Stanza. Subvergence is series of Shockwave applications that present an abstracted, noise-based visual destruction of the browser, desktop and interface. It is a collection of experiences that gather data from other websites and makes chaos out of the data, creating labyrinthine and poetic audiovisual structures that achieve irony by the unfamiliar abstract use of familiar interface and program structures and icons. In Stanza's work "Amorphoscapes", a collection of interactive audiovisual synthesisers on the web, leaves irony behind, presenting an exploration and celebration of generative, procedural functions of digital media.

In the remaining work presented at COSIGN this year the labyrinth emerges as the dominant metaphor for digital media. Lucia Leão deals with this explicitly and directly from an analytical perspective in "The Labyrinth as a Model of Complexity: The Semiotics of Hypermedia". Leão hypothesises that ancient studies of maps and labyrinths can help us to better understand and more deeply interact with complex virtual spaces. The labyrinth is present in the media in two ways: 1. in the organisation of media structures at the time of project development, and 2. the labyrinth created by a reader in choosing paths. However, as Leão acknowledges, using the metaphor is not straightforward, since the metaphoric relation is circular: metaphor B imparts knowledge about A, but what we know about B changes in the process. Hence the metaphor conceives a category that encompasses the two fields of knowledge. Using the etymology of the labyrinth may inform our conceptions of digital media, but our conceptions of digital media must then act back on our conceptions of the labyrinth.

The proposal is nevertheless compelling, since the labyrinth presents similar paradoxes of reason and associativity to those invoked by digital media systems. As Leão explains, the labyrinth is a challenge to be faced, and an image of high complexity. It is a rational human construction at its time of creation, but then at the time of experience it is a result of the expressions of users' desires. We can approach the labyrinth as rationalists or as associationists. These manifest Leão's "Theorem of Wise Ariadne", approaching the maze rationally to make it possible to try to retrace one's steps (the way of the back button and history file), or the "Theorem of Mad Ariadne", an experience of wild exploration to try to know the greatest number of ways.

The dominant conception of the web is essentially a rationalistic one, presenting it in terms of a place to be searched, where the gratification of desire is achieved by reaching a goal. Reconception of hypermedia or digital media in poetic terms means abandoning the attainment of goals as the source of gratification in favour of the process of moving through media spaces as an end in itself. In this we become a bunch of mad Ariadne's, seeking and creating the greatest number of different paths, not for the sake of the goal, but for the pure delight of the journey, the digital echo of David Daniels' primordial Beat Generation aesthetics.

Stanza's "Subvergence" fits this image of a hypermedia poetics, as does Reiner Strasser's various works including "desire", "breathe", and "vib~ratio~n", dynamic works of audiovisual poetry using text, images, animation and sound (music and voice) on the web (http://netartefact.de/cosign/). However, Leão's conception of complexity as "something woven as a whole" is "formed by a circular game in which order/disorder, chance/determination, interaction/retraction are conjugated in an infinite and simultaneous way". A hypermedia system presents as reality the articulation and organisation of complexity. But we can take this conception of complexity, and therefore of the labyrinth, much further than Leão's focus on hyperstructure, and delve into the most basic generative and procedural characteristics of the digital domain. Here we extend into a vision of the Virtual Poetry Domain (VPD) of the form articulated by Gyori. As Gyori states, hypermedia is a poor metaphor for the poetics of VR, since it is all syntax and no semantics. We can do better than this, since the computational agent implies a chance to create and permit the advent of languages of its own, implying the emergence of an n-dimensional virtual world, accessible through all of our senses, hyperconnected, intelligent, endowed with artificial life, an artificial intelligence- (AI) informed global VR space.

The generative media space makes explicit the symbolic construction of reality discussed by Johansson, since its production requires dealing explicitly with the expression of the symbolic substrate (for example, as pursued by Allert, Dhraief, and Nejdl in an eLearning context); we find ourselves necessarily engaged in Mayorez's project of Art Criticism in Cyberspace (described and embraced by Gyori), wherein analytic appreciation becomes a substantial part of the poetic creative process.

While Gyori's work deals with dynamising a visual syntactic structure of poetic textual language in three dimensional space, the aim of endowing artwork in the virtual domain with artificial life is realised in a more fundamental way, statically in Mark Stock's "Turbulence" series (http://mark.technolope.org/cosign2002/), and dynamically in Petra Gemeinboeck's immersive, 3D production "Uzume". In Uzume, users develop a playful gestural dialog with an abstract, virtual opposite. The viewer is present and involved by virtue of being tracked by the computer system. Hence the viewer influences the system, which in turn influences the viewer in a closed feedback cycle resembling the ancient Greek proposon, the face meeting the face; each reacts to the other, which then reacts to the other, in an infinite cycle. Uzume has four architectural layers: structures based upon chaotic dynamic systems with strange attractors, a virtual medium simulating a viscous fluid-like force field, sound parameters spatially mapped onto user movements, and a choreographic rule-based system controlling temporal conditions and initial properties of simultaneous events and transitions between configurations. The result is a system that is never fully comprehensible, each movement being part of an infinite evolution. Each interaction is undirected and sequences become arbitrary.

Hence viewers become players and attribute liveliness (life) to the evolution of the environment. The sense of life leads some players to talk to and yell at the dynamic abstract forms, creating emotional relationships; transformed reflections create a dialog between the self and the world beyond (as previously discussed by David Rokeby). The viewer can only approach this other in tiny steps, capturing brief moments of intimacy that immediately dissolve into something unfamiliar. It is the zone between interactivity and autonomy that creates the impression of life.

A generative view of digital media implies a vastly expanded labyrinthine space of possible experiences issuing from what may often be very simple representational structures expressed at the implementation level; this is, after all, the founding hypothesis of Alife research. But the simplicity of generative principles, taken together with the infinite space of possible experiences that they imply, brings the role of the active viewer back into focus as a key creative element. Questions of reality and identity become confounded when the viewer is so heavily integrated into the feedback cycles generating experience. And these questions become more complex when there may be many participants involved in creating varying degrees of collective experience. This occurs in Sponge/FoAM's T-Garden system, described by Valverde. T-Garden is a responsive environment in which visitors put on instrumented costumes and become performers. Performance movements produce mutating audiovisual shapes. Motion capture is accomplished using overhead video, as well as accelerometers and gyroscopes within costumes. Performers interact with each other, with objects in the space, and media elements; they must spend time in the space to learn and understand how performance partially determines the experience. Performers are involved at the core of the creation of the poetic experience, and there is little to be made of any sense of boundary between the artistic creator and the consumer.

Boundaries are defined symbolically (this is Lacan's most crucial insight into identity formation), so the ultimate plasticity of digital systems together with our consciousness of their symbolic constitution make them a powerful tool for the exploration of questions of identity. Valverde refers to the crisis of identity for the Western male universal, as explored in the Riverbed/Bill T. Jones production, Ghostcatching. Whether that is a personal crisis or not depends upon one's relation to that universal: the labyrinth provides a metaphor for the articulation of many alternatives, and has been interpreted (by Ross, http://www.friesian.com/gender.htm, for example) as a specifically female archetypal metaphor. Perhaps the labyrinth is best regarded as a generative matrix, within which many identities may be manifested. It is, then, a space of possible identities, and we are free, either to seek one path and definition within that space, or to move through it in an open exploration of endless different ways of being.

NarToo: a tool based on semiotics to support the manipulation of a narrative

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ABSTRACT
New communication technologies can be used in the design of multimedia communication artifacts to support the early stage of a creative process: the heuristic project. In this work we give a proof of concept of an application addressed to a specific kind of heuristic project: given the logical sequence of episodes of a narrative, the *fabula*, the goal is to obtain different plots expressed in multi-modal language. The case study is provided by the task of transposing a written synopsis to the multi-modal language of a movie. We adopted the semiotic theory of Greimas to analyze the narrative and reveal its deep structure. The application enables users to interact with this structure in order to simulate and anticipate the effects of meaning resulting from their manipulation.

General Terms

Design, Human Factors

Keywords
Structural Semiotics, Narratology, Multimedia Communication Artifacts.

1. INTRODUCTION

The research is focused on the role of the new communication technologies applied to the design of multimedia communicative artifacts in an heuristic project of. By *heuristic project* we mean the early stage of a creative process [2], when the designer hasn't yet achieved a structured knowledge of the task he is facing, but is still combining tentative elements, applying a trial-and-error method in order to evaluate different project solutions. Our field of investigation is restricted to the project *of multimedia communication artifacts* [1]: objects designed for communication purposes, which integrate heterogeneous information (written text, sound, animation and images) and are provided with interactive features.

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Information technologies support a wide range of design praxis, varying from product and communication design to architecture, urban planning or photography, where they provide powerful tools that can be employed during both the project execution and its post-production review. But information technology rarely supports the very first cognitive activity faced by the designer: matching the specification and the data of the task to his knowledge.

Our purpose is to investigate this matter by providing an example where new technologies are profitably used beginning with the heuristic stage of the inventive activity. To this end we present a prototype of an application, named NarToo (Narrative Tool), addressed to an author dealing with a specific kind of heuristic project: given the logical sequence of episodes in a narrative, the *fabula*, the goal is to obtain different *plots*, expressed in multimodal language, therefore enriching the expression of the narrative with different media, that synergically act to convey the ultimate message. The terms introduced by structural semiotics are discussed in the following § 2. and § 3. The case study is provided by the task of transposing a written synopsis to the multimedia language of a movie as it is explained in § 4.

We apply an interdisciplinary approach to the research, involving different epistemological approaches. Semiotics discloses a very powerful perspective to look at the empirical field of design. In particular the structural semiotics applied to narratology, which is the tradition that links Propp [7] to Greimas [6], define the elements system and the combination rules that users manipulate to accomplish the task of generating new plots from a *fabula*. The theory provides a user interaction model as well, imposing the degree of freedom by defining legal and illegal operations, and suggesting an inventory of samples and hints that are helpful during the inventive process.

Interface design, on the other hand, plays an important role in the application development. The design discipline can help to reduce cognitive complexity, allowing a wider audience to access a cognitive domain in the process of knowledge distribution and assimilation [4]. The design process contributes to structure *data* into *information* and information into *knowledge*. Raw data, when structured, becomes information so that an interpreter can receive and perceive it. The designer, therefore, enhances understanding and action effectiveness. He makes the knowledge sharable among people, preventing it from being abstract, neither accessed nor experienced.

2. SCOPE OF THE APPLICATION

The application concept is grounded on the theory of narratology. Russian formalism [9] introduces the distinction between *fabula* and *plot*: the first one refers to the logical sequence of the episodes in a narrative, whereas the second one refers to a potentially different sequence altered in order to express the fabula following artistic rhetoric guidelines, i.e. flashback or flash-forward, elision. To obtain different filmic plots from the linguistic plot of the treatise, it is necessary to refer to the underlying structure of the fabula. Disregarding the order of the episodes in the treatise, the author of the new plot has to consider the fabula in order to recompose a chain of episodes suitable for the new medium. The tale analysis reveals the *substratum* of the narrative underlying and supporting the expressive surface. The independence of the substratum from the *expression* grants the possibility of shifting the content from one medium to another. A novel can be transposed into a movie or a ballet: although, at the level of expression, the audience perceives it as completely different, the narrative maintains a consistent form.

The target user of the application is supposed to be anyone coping with the task of de-structuring a written text before producing a new story in a different expressive medium: for instance, a trainee director and a movie based on a given synopsis. The task deals with two different subtasks, addressing the different levels of *expression* and *content*. At the first level, the trainee has to shift from a mono-medium expression, which employs just the linguistic medium, to a multimedia expression, involving several perceptive registers and triggering sensorial interaction phenomena and synesthetic perceptions. At the level of content the trainee manipulates the chronological sequence of the events in the *fabula*, applying for instance flashback or flash-forward, in order to produce different kinds of filmic plots. He or she assigns to actors their functional roles in each episode of the narrative and decides upon the point of view in a scene, attributing the role of first-person voice to an actor.

A problem inherent in the transposition of a written text into a movie consists in the segmentation of the authorship into several professional roles: the director, the play writer, the art director, and the costume designer. This process faces a risk of heterogeneity [3]. The application provides a project tool to prevent possible interpretations in conflict with the original fabula. Moreover, transposing the original, homogeneous, linguistic expressive mode into heterogeneous significant - images, sounds and video for instance - it is necessary to keep under control, from the perspective of epistemology, the new significant in order to prevent the corruption of the original communicative program.

From users' perspective the application addresses two goals: to increase the users' cognitive competence about the narrative substratum and the logical chain of events in the fabula; and to support users on an operational ground, when they become authors of the new plot. Indeed, the application provides a means to interact with the narrative substratum, so that it will appear with more evidence. In addition, the application provides an archive, initially empty, where users will store and retrieve their first attempts of iconographic and multimedia material, gathered or created to express the new plot, in order to test the accomplishment of different effects of meaning.

Users achieve a robust understanding of the deep structure while interacting with the system before facing the film production with the appropriate professional tools. The goal of film making is obviously beyond the scope of the present application, that instead grants users the possibility of anticipating and simulating different effects of meaning in their initial creative process, by matching experimentally images, sounds or videos, according to their poetics. The application provides a useful tool to evaluate in advance different project solutions, preventing costly changes in later reviews.

3. THE THEORETICAL BACKGROUND

Greimas provides a semiotic interpretation of a narrative [6]. He proposes a structural interpretation of a narrative, by defining six types of Actant: the *Subject*, the *Object*, the *Helper*, the *Opponent*, the *Destinateur* and the *Receiver*. The main character is the hero (the Subject) who wants to reach an object of value (the Object). In his quest, someone or something is helping him (the Helper) and someone or something is hindering him (the Opponent). The other two types of Actant define who or what is pushing the subject towards his goal and who or what receives the object of value obtained by the subject.

Adopting Greimas' model, a story evolves according to several *narrative programs*, arbitrarily complex, developing different *themes*, i.e. the conquest of love, jealousy among rivals, search for power, through some stages, called *narrative units*. At first, an agreement is established, which set the frame and the conditions under which the events will occur, and the Subject receives a task by the Destinatuer; this stage is called *contract*. For instance, the hero accepts the task of freeing the king's daughter from the seven-headed dragons. The hero performance presupposes a competence, which retrospectively explains why the hero will be able to reach his goal. The acquisition of the *competence* and the *performance* together form the *action* stage, in which the Helper and the Opponent will intervene contributing to a successful outcome or a failure. According to the result of the undertaken action, the Destinateur will reward or punish the hero. This final stage is said to be the *sanction* stage. Each narrative program that develops a theme is segmented into these four narrative units: the contract, the competence, the performance and the sanction. A story has not to make explicit each narrative unit, but even if any of them is unexpressed it is logically implied: for instance, often in the literature we find successful actions that are not explicitly rewarded.

These semiotic categories should not be thought as able to explain the structure of fairy tales only: for instance, the Opponent could easily be the a limited resource of time or money and the story could be about someone trying to achieve a goal whatsoever within limited resources. Actually, the Greimas' model can be adapted to analyze a general text, regardless its expressive medium: a novel, a ballet, a painting or a picture or even human transactions, such as the establishment of a trusting relationship between a company and a customer [5].

4. THE CONTENT ARCHITECTURE

The case study is based on a synopsis about the story of the Borgia's, a very powerful family active in Rome between the XV and XV and the XVI centuries. The story, starting in 1492 and extending through 1503, tells us how Rodrigo ascended the pontifical seat and managed his religious and secular power in an unscrupulous and unbiased manner. The plot has been exploited

several times because of its muddled nature and complex mix of human and political feelings, and because it is strongly related with a dark phase of the history of the papacy.

The application core is fueled by data from this story but it could be used with other subjects as well. We chose this particular one because the unpublished synopsis is intended for a movie, not yet realized. This leaves users free of conditioning from previous staging and artistic choices.

Users access the narrative structure through three keys: the narrative themes, the characters and the scenes.

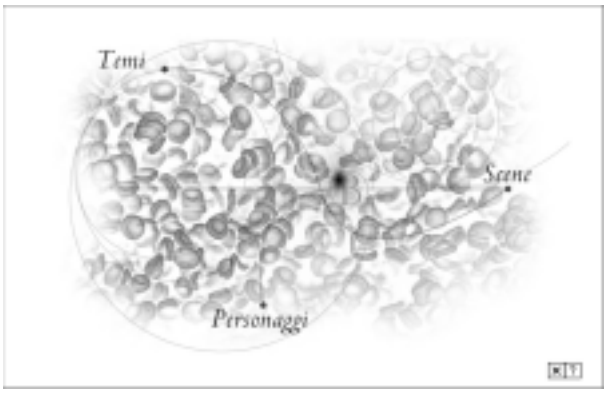


Figure 1. Access by themes, scenes or characters.

Some of the themes involved in the story are: the struggle for the papacy, the rivalry between brothers for the father's love, the political alliance between powerful families and many other.

Each theme develops along several scenes in the synopsis, which are not necessarily contiguous in the fabula chain, and sequential scenes may refer to different themes. The correspondence between themes and scenes is not one-to-one but one-to-many both ways. Actors, appearing in a scene, embody a functional role, assuming one of the Actant mentioned in the previous paragraph, according to the theme or themes in that scene. Different themes are weaved together to create the plot.

Scenes and themes are related to different levels of a narrative: while themes are deeper in the narrative substratum, scenes are immediately perceived by readers and are related to the expression level. When we read a synopsis we learn the partition of the text in different scenes, and the details herein described, such as names, dates or places. Below this easily perceived level, there is a thread that links together different scenes, possibly apart in the text, one is not immediately aware of and that need to be reconstructed analyzing the text. The thread acts as a guideline for the theme that is developed over different scenes. To gain a good comprehension of the story it is important to have a global vision of the threads of themes developing over the scenes.

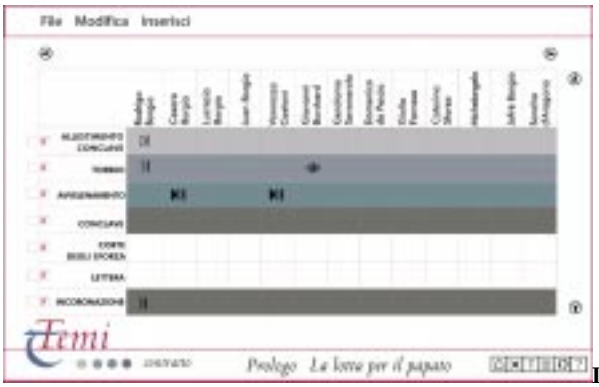
In our case study the theme of *Lotta per il papato*, the struggle for papacy, develops over five scenes, as illustrated in Figure 2. The first scene in the prologue, *L'allestimento del conclave*, the setting up of the conclave, corresponds to the narrative unit of the contract, in which the reader is told that the last pope is dead, that the papal seat is vacant and a new one is to be elected by the cardinals. The scene of *I torbidi*, the riots, constitutes the narrative unit of competence and describes the political atmosphere in Rome and how alliances between the powerful families of papal candidates are sought in order to gain the majority of cardinals' votes in the conclave. In the scene of *L'avvelenamento*, the poisoning, represents the performance stage of the action, where one of the two main competitors kills political enemies. The final sanction of the Cardinals Council, acting as the Destinateur in this theme, states the winner of the political competition and selects the new Pope, Rodrigo Borgia. This narrative unit is split in two non-contiguous scenes: *Il conclave*, the conclave, and *L'incoronazione*, the ceremony of crowning. In these scenes Rodrigo acts as Subject, the papal seat is the object of value to be conquest, Giuliano Della Rovere competes with Rodrigo Borgia for the seat, the families Borgia and Sforza act as Helper and Orsini and Colonna as Opponents.

The actantial roles of the actors is shown in the interface displaying special icons, as it can be seen in Figure 2.; as well as the role of first-person voice attribute to an actor.

The content is structured also by scenes and characters, besides by themes. Accessing the content by characters discloses their functional roles in themes, that is the actantial role they assume in each context, according to the theory. Whereas, accessing by scenes allows gaining an overall picture of the themes developed in that scene. The content architecture provides, therefore, a dissection of the plot at a structural level, revealing the deep semantic structure of the story and allowing its separation from the expressive level.

5. THE INTERACTION

The application interface provides two interaction modes: *editing* and *browsing*. A working session may imply going back and forth between these two modes. The editing mask is a matrix chart: a rectangular grid along two axes, which can be used to reveal features in the data against two categories. The matrix can record four features: the relationship between the categories, the types of data in these relationships, the data quantities and the combination of all three [8].



In

Figure 2. Editing matrix chart.

In the case of an access by theme, see Figure 2. above, the matrix chart displays the scenes on the Y-axes, taken in the order given by the fabula rather than by the synopsis. On the X-axes, the characters are displayed. The line corresponding to a scene relative to the chosen theme is highlighted in a given color code, according to the narrative unit of the scene, as visualized in the

interface as well. Scenes that do not develop that theme are not colored at all. In the matrix the cell corresponding to the couple Character-Scene shows the icon symbolizing the actantial role of the character in that scene.

In the figure, the chosen theme *Lotta per il papato*, the struggle for papacy, develops over non-contiguous scenes and the interface shows the narrative units in which the theme is treated. Therefore, users can at a glance visualize the scenes developing a specific theme and those unrelated, besides getting the occurrence of characters in the themes and the role they are playing.

The interface design relies on diagrammatic representation of the narrative structure. When the model used to represent a content structure is in good correspondence with the matter, the model itself enhances the cognitive comprehension and assimilation of the subject matter that becomes easily readable and intelligible. The use of the matrix, the line and organizational charts does not require users a specific skill in narratology and makes the subject more comprehensible.

The editing functionalities enable users to produce a new scene order; to elide scenes that will not be explicitly rendered in the new plot; to change the first-person voice role, that is the point of view of a specific character, through whom the entire scene will be narrated.

The interface allows also collecting the multimedia material in a meaningful organization and overall to associate it to scenes or characters. The multimedia material has to be prepared before hands and the system is not intended as a multimedia editing tool. These data are structured in a database and users can also store together with the data itself the association to an element of the discourse: a theme, a scene or a character.

The *browsing* mode enables users to test different effects of meaning while manipulating the narrative. Interacting with the application in this mode, given the selected theme, at first a line chart is shown, outlining the theme through the scenes, in which it is articulated, and representing the narrative units. Upon selection of a scene an organizational chart is loaded, that visualize symbolically the Object, at the centre of the chart and the couples Actant-Actor represented in the scene: in Figure 3.

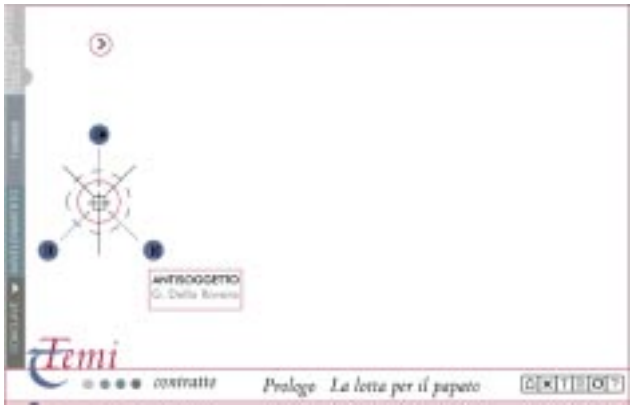


Figure 3. The browsing organizational chart.

The selected scene is the *Allestimento del conclave*, in which the Actants actually present are the Destinateur, played by the Cardinals, the Subject, played by Cardinale Rodrigo Borgia and the Anti-subject, Cardinale Giuliano Della Rovere. The Anti-subject is generally competing with the Subject for the same Object of value; he could have undertaken the Subject role himself in a different setting where the narration would develop according to his point of view.

Browsing further in the theme, users start an interactive session to sort and organize the multimedia material temporarily stored in a multimedia library, in order to analyze their poetic choices and test different effects of meaning, see Figure 4. Through a dialog box they will decide upon the material they are concentrating their attention on and will be able to select videos, audios and images.

Figure 4. The browsing window.

The visualization of videos and images can be accompanied by different audios. This allows the user to test the synergism of multimodal stimuli. The collected images are displayed as icons and can be zoomed in. Navigating a scene, users can also read the related text in the synopsis, which will appear with a different color in the screen; besides opening and editing note cards stored during an editing session and to open related URL.

6. THE IMPLEMENTATION

The application is stand-alone and written in Java2. The core of the application is an object-oriented database, whose objects model the elements of semiotic analysis: themes, scenes, narrative units, actors and actantial roles.

The database is implemented in Java and we adopt Jeevan from W3apps Inc., as support platform. Jeevan cannot give us a fully-fledged client-server DBMS but a structured file system archive like the well-known gdbm library from GNU. This solution is suitable for our needs since the software module is not very large; no external database is spawned nor need to be administered. Moreover, adopting this library makes programs easier to code.

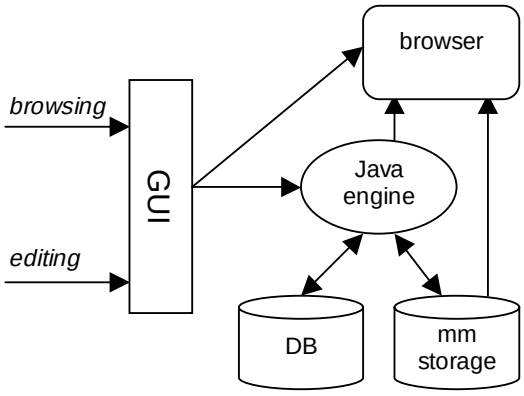


Figure 5. NarToo architecture.

Information in the database can be accessed in two modes: the database management mode, through a java administration panel, to directly query and modify the database or to perform the initial population with preloaded data and the normal working mode, through an appropriate graphic interface.

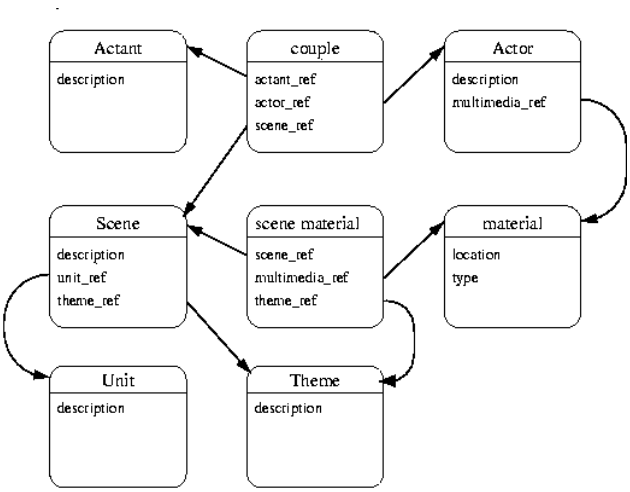


Figure 6. DB objects.

For some class of objects images, animation or sounds can be stored in different formats. The multimedia material is not stored in the database itself but in the file system and it is manipulated by Java. When a multimedia file is selected from the file system to be associated to some objects, during an editing session, it is copied in an internal directory. This approach has the drawback that it takes up more space on the local disc, but solves some other problems: if we would store in the database the file location, the application will no longer work properly when the file is moved from the original folder or removed. Moreover, this design choice leaves more flexibility for re-organizing the multimedia material in a meaningful scheme for the author. The multimedia material is sorted by assigning labels to local copies. Care must be taken when adding and removing material to an element, a scene or a character, because of other pending references.

The browsing takes place in a browser window called by the GUI interface and displaying the material assembled by the Java engine. This choice is dictated by the opportunity of leaving the highest flexibility in terms of the file formats that authors may want to use.

The graphical interface is implemented in Macromedia Flash, by means of a different thread. In our application we deal with two different technologies that need to communicate: Java and Macromedia Flash. Java can make our application portable and platform independent. It's easy to master but has poor GUI capability, even when using the graphic library, swing. Programs that need graphic user interface are difficult to code and it is hard to cope with the requirements from the designer. On the other hand Flash is a GUI oriented technology.

There is no way to integrate a Flash application with a DBMS engine or store efficiently data on the local drive. The problem is how to let data flow from one side of the application to the other one. Flash cannot call Java classes but only stand-alone programs. A solution would be to code a separate application for any implemented functionality. But this would be too expensive in term of performances, because at every new call the database needs to be opened, modified and closed. Java, on the other side, cannot be used to drive everything happening during interaction, since GUI events are coming from the interface.

To overcome these problems we use Java as the master program, the Java engine in Figure 5. Upon initialisation of the engine, the GUI module is launched, as a new separate process. The engine then waits for requests coming from the GUI module in Flash. Such requests are performed using the HTTP protocol on a loop back connection. The GUI performs the request of a URL with the following syntax:

```
http://localhost:port/COMMAND&parameter&p
arameter&parameter
```

Where `COMMAND` is the requested operation and `parameter` indicates one or more parameters, separated by character `&`. The Java application parses the string sent by the GUI, acts on the database and returns data as text that will be interpreted and rendered by the Flash application or by the browser.

As an example, the command to ask for information is `SND` (send) that can have different parameters:

```
http://localhost:port/SND&SCN0
```

asks for labels of scenes (`SCN`), the numeric suffix `0` means all scenes, other numbers specify a given scene. The information sent back are a number of strings separated by `&`, in the following order:

```
SCN0=3
```

to indicate that there 3 scenes in total and then the successive strings with the requested labels:

```
SCN1=<scene_name>
SCN2=<scene_name>
SCN3=<scene_name>
```

To ask for the attributes of a given scene, say scene 1, we would use the command:

```
http://localhost:port/SND&SCN1&ATS0
```

the result of which will be, for instance:

```
ATS0=21
```

that according to the syntax means that scene 1 represents a narrative unit *contratto* (2) and that it has been elided (1).

In a similar fashion we can get data about actors with the command:

```
http://localhost:port/SND&ACT0
```

that will retrieve the number of actors in a given scenes and their names and their roles.

These streams of data from the database are used by the GUI to fill the charts and the matrices in the interface. This approach is preferable to the use of a web server with cgi scripts, because we don't need a local web server. Moreover, in the same way we can perform operations that are more easily implemented using Java, rather then Flash, e.g., dialog boxes to catalogue multimedia material.

7. FINAL REMARKS

As we mentioned in the introduction, this research and application originated from the intention to investigate the role of communication technologies in the initial stage of the inventive process. We need a model of the inventive behavior and a working definition of the heuristic stage of any project process. Talamo [10], in a series of interviews about the dynamical process actuated by a project, points out two facts common to all interviewed. The first fact states that the core of the invention happens before the process of actually implementing the work. The second fact is that authors usually need a central initial hint, even a random occasional one, which will enable them to shape their early-unstructured reflections. It turns out that the inventive process takes form from a set of rules or guidelines assumed as the semi finished core to which the author applies a recombination process adopting assonance, dissonance, association and analogies. How these techniques will be combined depends on the individual poetic of the author.

The creative process starts from the assumption of the set of accepted guidelines but progressively leaves them until a new original piece of work is generated: it is the path that leads from the known to the new. Even the meaning of the word *heuristic* implies a process of discovering the truth by experimental trial-and-error methods. At the end of a heuristic project the solutions found are to be compared with the initial assumptions in a cycle that could be repeated more than once.

The application NarToo supports the early stage of the inventive process, both at the expression and the content levels. The author starting from the skeleton of the narrative substratum enriches the structural elements with figurative details: an Actant is instantiated with an actor and some expressive material, such as an image, a gesture, a voice tone-color or some costumes, is associated to that actor. The multimedia archive is growing with its use since authors store material with diverse expressivities, following successive phases of their inventive process: a contemporary musical excerpt, a more philological one or even a digitized noise; a sixteenth century painting, a colored abstract form or an animate picture combining the two. After accumulating the material they can proceed combining elements and by trial-and-error they can probe different perceptual effects by putting side-by-side different materials: e.g., an abstract motion picture with a philological musical excerpt. While they are working on the perceived surface of the narrative, authors are enabled to manipulate the content of the narrative to produce new versions of the plot, altering as we said the order of scenes or deciding to elide some of them.

The content architecture of the application is realized by a database, which can be loaded with different data to allow a different application context. Only the present graphical layout of the GUI is related to the content of the prototype and it should be changed to accommodate different and generic data, but the GUI itself can already deal with a different database.

The communication model between the core application and the GUI is enough generic to be general purpose and will be subjected to further investigation, because it easy to implement and allows web-based applications with friendly and powerful interfaces implemented in different technologies, to access the host local resources.

The prototype is presently under testing by the synopsis authors as the project of transposing it to a movie evolves.

One of the improvements that we foresee is to structured the text in XML in order to implement the semiotic analysis and to allow more meaningful association between the narrative substratum of the fabula and the text.

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Meta-Level Category ‚Role' in Metadata Standards for Learning: Instructional Roles and Instructional Qualities of Learning Objects

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ABSTRACT
The meta-level category '*role*' is originated in the field of semantics. Integrating the concept of *roles* to object oriented modelling as well as to the meta-model of the Standard for Learning Objects Metadata (LOM) can solve the problem of annotating different epistemologies, paradigms, theories, and instructional principles in learning and instructional design. In order to reuse and exchange learning objects we need information about these learning objects. The LOM draft standard defines a set of more than 70 attributes, which specify learning objects (titel, author, subject e.g.). However, even though the LOM draft includes a category educational, no information is included in the standard to specify the instructional quality of a learning object, nor to specify which instructional roles are filled by a learning object within a learning process. In this paper, we show how to include this important instructional information using the concept of instructional roles in a way, which is extensible and flexible enough to specify criteria prescribed by different instructional theories.

General Terms
Standardization, Theory.

Keywords
Meta-level Category '*Role*', Metadata, Instructional Design, E-Learning, Standard for Learning Objects Metadata LOM

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1. BACKGROUND AND CONTEXT

1.1 : The Meta Level Categories 'Type' and 'Role'

In this first chapter we expound a basic comprehension of the formal term "role" based on the work of Steimann (also citations are taken from Steimann) [22]. In the following chapters we will apply the concept of roles to the Meta-model of Metadata Standards for Learning (LOM e.g.).

According to Steimann, the term 'role' as well as modelling itself is originated in the philosophy of language. Eco in this context calls Lodwick (1619 – 1694) the first progenitor of lexical semantics. Lodwick does not start from the substantives (from nouns or names of individuals and genera, which was usual in aristotelic tradition) but from actions. Actions then are populated with actors and characters: with abstract roles, that can be connected to person's names, things, or places acting, re-acting and being acted. [5]

Lodwick distinguishes "appellative nouns" from "proper nouns". This differentiation is based on two qualities, which are established by Husserl (1859 – 1938) and Guarino. These qualities will in fact distinguish natural types and classes from roles in object-oriented modelling: Husserl introduced "Fundierung" (en: funding), Guarino [6] specifies semantical or ontological rigidity. Guarino [6] gives an formal definition of the term role and distinguishes the concept *role* from the concept *natural type.* A concept is funded if none of its instances can exist alone. Each instance has to be related to an other. A concept is semantically or ontologically rigid if an instance can not join and leave the extension of the concept without loosing its identity.

If x has the property of being an apple , it cannot lose this proporty without losing ist identity (...). This observation goes back to Aristotelian essentialism (…). [7]

Roles are those concepts which are funded but not semantically rigid. Natural types are those concepts which are semantically rigid but not funded. Linguistics has worked out an common theory of formal languages:

In der Theorie der Sprachen, formaler wie natürlicher, taucht ein Begriff immer wieder auf: der der Rolle. Rollen komplettieren die für die Sprachtheorie so wichtigen Konzepte Prädikat (als Träger der Aussage eines Satzes) und Objekt (als Ergänzung des Prädikats) um die Beschreibung der Funktion, die das Objekt in die Aussage ausfüllt. Rollen sollten damit, genau wie Prädikate und Objekte, fundamentaler Bestandteil jeder Sprachtheorie sein. Doch während die Formalisierung von Prädikaten und Objekten heute eine Selbstverständlichkeit ist, tut man sich mit der Einordnung des Rollenbegriffs in formale (Modellierungs-)Sprachen vergleichsweise schwer. [22]

While the concept of roles does not play any role in formal languages, including the logics (cp. modeling and the formal grounding of maths by FREGE (1848 – 1925)), it plays a major role in linguistics (cp. [3]). Standardisation of the term "role" in modeling complements the categories type and relation. Individuals of types can play roles. Types fill roles. Different from natural types, the character of roles is dynamic. Roles are dependent from relations and context. Roles specify the interactions of individuals. Individuals are classified dynamically by the roles they play. Each individual of one type can play different roles (polymorphism).

1.2 Standardisation in Learning

In this section we discuss the context in which standardisation in Learning takes place. Standardization has to face a context of diversity: a wide variety of diverse instructional models, learning theories, instructional principles, and paradigms guide the design of learning environments both explicitly and implicitly. Standardisation has to address controversial goals and assumptions on learning. We will state some contrasts:

1.2.1 Effective teaching as well as theory of change

Several initiatives focus on effective learning as SCORM (ADL) does: *As new instructional technologies emerge, they provide opportunities for universally accessible and effective life-long learning* [1]. But Janneck states controversial trends in initiatives of improving teaching and learning: Whereas public and politics postulate more effective learning, discourses in educational science focus on qualitative change in learning culture [9]. Learner centered approaches exist in parallel to instructionalist and teacher centered approaches. Distribution and teaching of knowledge exist in parallel to facilitating collaborative co-construction of knowledge and peer-tutoring (in CSCL) e.g..

1.2.2 Learning objective: Knowledge as well as competences

Many computer based learning environments are restricted to the teaching of knowledge and concentrated on organising and structuring units of information (knowledge objects). They focus on the ‚right' curriculum and life-long learning of knowledge on demand. But developing new tools and learning environments also enables learners to acquire skills and social competences. [10]. Whereas some learning environments imply learners which are selforganised others aim at imparting the skill of selforganization.

1.2.3 Valuable diversity

Standardization has to address any scenario based on diverse requirements and assumptions on learning. Therefore the context for Standardisation in Learning is well characterised by Lyotards comprehension of science which is explained by Beck: There is need to emphasise in a postmodern manner the conflicting diversity of models, the competition of paradigms, and the impossibility of integrative and finally valid solutions. The failture of integrating theories is specified a characteristics of postmodernism [4]. Standards that aim at instructional neutrality must fail from the point of view of the science of philosophy. They risk to address a narrowed perspective on learning. Also the formation of a pedagogical meta-model [15] is not what we intend. We want to open the view on learning in standardization and propose an approach of Instructional Roles in Learning Metadata Standards, which supports the idea of explicitly modelling and annotating different paradigms, models and principles in learning.

2. APPLICATION OF ROLE-CONCEPT TO STANDARDS FOR LEARNING OBJECTS

To allow the reuse of learning objects (LO), various standards have been developed to describe learning objects, their relationships, etc. The IEEE LOM draft standard for learning object metadata [16] specifies a variety of bibliographic and technical properties of learning objects, as well as different relationships between learning objects, and make exchange, reuse, and search of learning objects based on these metadata possible. However, even though the LOM draft includes a category educational, no information is included in the standard to specify, which instructional roles are or can be played by a learning object within a course. As curriculum programs do, LOM concentrates on what should be taught and when, rather than how to teach. Obviously, a standard for learning objects metadata should not tell how to teach, but it should definitively be able to provide information on how to specify pedagogical aspects of learning objects.

A recent paper by Schulmeister emphasizes this point: While potential students of distance learning courses can search for price, author or subject of courses, they cannot search for criteria which are as important as these more formal attributes: *What information is given on whether students of law at the Cyberversity of European Law are coached more intensively than students from Capella University, whether one can take part in collaborative learning activities at the Athabasca University which are not available at ESC Pau? All these questions remain unanswered up to now.* [21]. Schulmeister claims that students cannot choose courses or learning units in a meaningful way on the basis of standards like AICC, SCORM, and IMS, as instructional principles of online courses are not addressed so far in these standards [21]. We add some additional questions students might have: "Which learning processes are supported?", "Is communication among learners embedded in the program?", "Is computer supported collaboration included?", "Does the course unit meet my preferred learning style?".

This difficulty is caused by the fact, that LOM attributes specify properties only at a very basic abstraction level. LOM specifies annotations for content and activities (Learning Resource Type -

Vocabulary: e.g. Exercise, Simulation, Questionnaire, Figure, Table, Narrative Text). LOM does not support metadata about instructional models and instructional theory, even though authors are implicitly or explicitly using specific instructional theories, and LOM does not support information about the use of learning objects in learning processes, which are a central concern in instructional design.

Specifying author and title is of course easier than specifying instructional information, but the question, whether LOM can be extended to implement the specification of instructional metadata related to instructional models and instructional theory, is an urgent one for a standard defining metadata for learning objects.

The approach discussed in this paper extends previous work which has tried to extend LOM with didactic metadata. Meder establishes a detailed ontology for instructional design ("Didaktische Ontologie" [17]), but he only differentiates existing LOM categories and attributes and introduces additional types and corresponding vocabulary to specify the types of learning objects (detailed KnowledgeTypes, types of CommunicationsMedia, Transaction/Assigment, and CommunicativeContribution) and types of hierarchical and assoziative relations linking these learning objects (MatterOfFactRelations are subdivided into HierarchyRelations and RefersRelations). This additional vocabulary is highly structured. But authors must be familiar with the use of this vocabulary in different educational contexts, no support is given based on corresponding instructional theories or learning processes. The current paper extends this and similar approaches, by introducing an additional abstraction layer to the LOM specification which explicitly takes different instructional theories into account.

In this paper we investigate which additional specifications for learning object metadata related to instructional criteria are useful, and how these metadata can be specified and grouped, based on the corresponding instructional theories. We include an introduction to the current LOM standard, draft 6.1 (April 2001), discuss abstraction levels of pedagogical dimensions, and introduces a concept of instructional roles in modelling.

3. CURRENT LOM MODEL

The Learning Object Metadata Standard (LOM for short) [16] defines a structure for interoperable descriptions of learning objects. It aims at facilitating search, management and (re)use of learning objects by authors of online-courses, teachers and learners. A learning object is defined in the LOM specification as "*any entity, digital or non-digital, that may be used for learning, education or training*." [16]

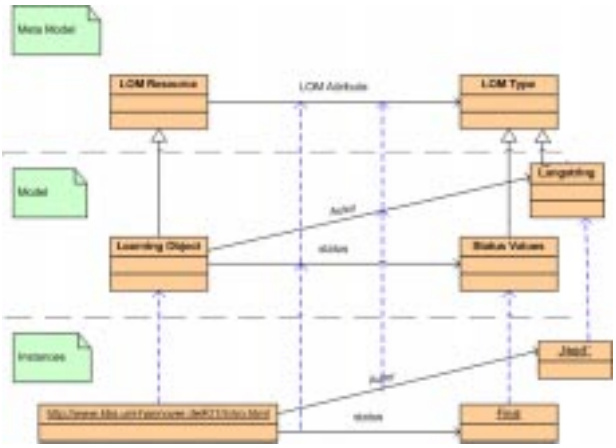

Figure 1. Current LOM Model.

The LOM basic schema consists of nine categories: the *General* category, the *Lifecycle* category, the *Meta-metadata* category, the *Technical* category, the *Educational* category, the *Rights* category, the *Relation* category, the *Annotation* category, and the *Classification* category. Each category is a grouping of data elements describing a learning object, for instance the General category groups general information about the learning objects such as title, description and keywords (Property, Attribute). This basic schema implicitly described in the specification is a rather simple one, but it is not explicity modelled by a common meta-model within the LOM specification. To make this meta-model more clear, we have modelled this LOM basic meta model using the Unified Modelling Language (UML) based on the LOM Draft Standard for Learning Object Metadata (Figure 1).

As shown in figure 1 the LOM Meta-Model consists simply of two types/classes: the LOM resource and the LOM type, linked by LOM attributes (LOM data elements). In the model layer we have only the learning object itself, the attributes describing the learning object and the datatypes for those attributes. In the LOM specification two types of data are defined:

- *Langstring*, which represents one or more character strings.
- The second type is just a set of values for a given LOM data elements (attributes), called *value space*. For instance the data element named *structure* in the category *General*, underlying the organizational structure of a given learning object has 8 values in its value space (*Collection*, *Mixed*, *Linear*, *Hierarchical*, *Networked*, *Branched*, *Parceled*, *Atomic*). This corresponds to the usual enumeration types present in many programming languages.

The descriptions of LOM are context-independent and static classifications. This is not appropriate for many didactic aspects: To characterize "collaborative learning" the type resp. the vocabulary "collaborative" can hardly be added to a single category, as "collaborative learning" is an instructional principle which affects and shifts the entire environment: the role of teacher and learner (Intended End User Role (LOM 5.5)), activities, interactivity type (LOM 5.1), Context (LOM 5.6), Typical Learning Time (LOM5.9), purpose, organizational framework, and many more. The current LOM model does neither provide concepts for modelling instructional models, instructional principles, nor to specify epistemological approaches.

4. BASIC INSTRUCTIONAL FRAME-WORK

4.1 Pedagogical dimensions – Abstraction Layers

As we claim that LOM does not integrate pedagogical dimensions we start by defining what we consider as pedagogical dimensions in this context. We choose a top-down-model in which pedagogical dimensions are imbedded in different layers

of abstraction - according to educational and cognitive sciences. In this model, LOM only addresses the bottom layer which is the most basic.

4.1.1 Top-down-model

4.1.1.1 4th (highest) layer of abstraction: epistemology, paradigm

The highest level of abstraction addresses (whether implicitly or explicitly) broad orientation concerning epistemology resp. theory of cognition. This layer is often referred to as paradigm or as way of teaching, learning, thinking and designing. Behaviorism, cognitivism, constructivism are major approaches. Papert for example distinguishes between two main approaches, which contrast learning with teaching: he distinguishes constructionism from instructionism [19]. In practice instructional design often is a mixture of different paradigms.

4.1.1.2 3rd layer of abstraction: (instructional) principles.

From epistemology we can derive one or more instructional principles. Merrill refers to this layer as "set of underlying principles". Examples are:

- Anchoring new concepts into the learner's already existing cognitive structure will make the new concepts recallable. [2]
- Problem solving will make knowledge transferable.

In the literature as well as in practice we often find fixed terms comprising some well-agreed principles:

- Problem Based Learning (PBL)
- Communities of Practice (CoP)
- Case Based Learning

4.1.1.3 2nd layer of abstraction: instructional models, learning theories.

According to Merrill, "principles are implemented by a program" and, "a program is based on principles" [18]. Instructional models and theories, as well as communication theories are guidelines or sets of strategies. Models often structure learning processes into several phases, make learning cycles explicit, and organize learning processes in a specific way.

4.1.1.4 1st (basic) layer of abstraction: content, practices, activities.

Content, practices, activities and sets of activities, scenarios and curriculum programs assembling content are located at this layer. This layer talks about what is done and to be learned as well as which resources are actually used. The current LOM Metadata Schema only addresses this layer.

4.1.2 Discussion of top-down-model

The domain of instructional design and educational science suffers from a lack of shared terminology. The term "theory" for example is used at different levels. Some learning theories are worked out as conceptual frameworks, constitute certain instructional principles, and are close to the highest level of abstraction (Ausubel 1960, Subsumption Theory. Klafki 1993, Bildungstheoretische Didaktik & Kritisch-konstruktive Didaktik e.g.), other theories are located almost exclusively at the most specific layer and therefore tend to be models (such as McCarthy

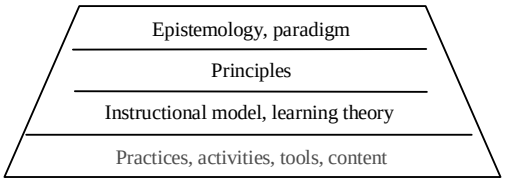

Figure 2. Top-Down-Model.

1996, 4-MAT [18]e.g.). Pedagogy as well as instructional design are ill-structured domains. Historic as well as cultural background is relevant in forming terminology as well.

The top-down-model makes clear that any decision which is made at a higher level of abstraction affects the more basic levels. Choosing the PBL principle results in shifting learning process, the role of teacher and learner, organizational structure and actual activities e.g.. Epistemological approach, instructional principles, learning processes and phases are not addressed by LOM. When including pedagogical dimensions we must provide for continuous change, trends, different cultural backgrounds,

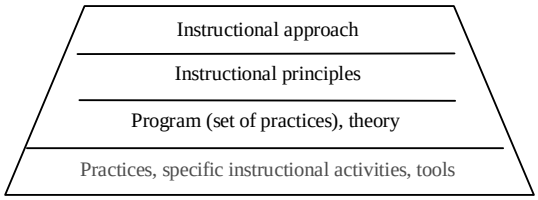

Figure 4. Top-Down-Model referring to Merrill.

ongoing social development, educational traditions, even individual beliefs in a specific approach. Hence, is it possible to fit pedagogical dimensions into standards? Our top–down approach basically reflects the German tradition of teaching as a reflective practice [25]. Klafki in 1985 re-innovates and reflects the term „Bildung" which was central to Wilhelm von

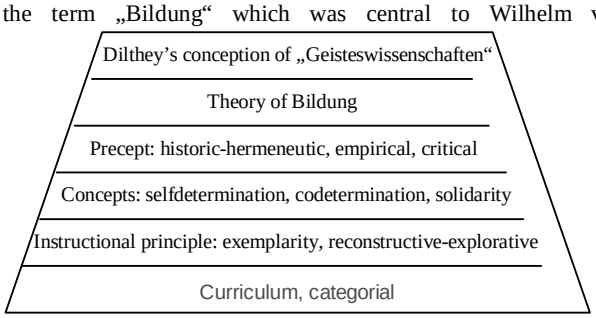

Figure 3. Top-Down-Model referring to Klafkis "Kritisch-konstruktive Didaktik".

Humboldt's Theory of Bildung in the epoch 1770 to 1830, the late Enlightenment („'Bildung' als Zentralbegriff pädagogischer Reflexion" [12] - Kritisch-konstruktive Didaktik). Klafki emphasizes the significance of classical theories of Bildung for a

contemporary concept of Allgemeinbildung [13]. Drawing a top-down-model from his concept might look like shown in figure 3.

Hence, the top-down-model presented in this paper is derived from German tradition of education. But there is obviously an urgent need for implementing a model in LOM that reflects both, American as well as European thought, and hopefully also other tradition in the field of pedagogy and instructional design. American education is influenced by curriculum theory and curriculum traditions and starts from a different cultural backgroud (Starting a Dialogue: A Beginning Conversation Between Didaktik and the Curriculum Traditions [8]). Curriculum theory concentrates on understanding the overall educational significance of the curriculum.

Analogies between these different traditions can be stated: Merrill in "First Principles of Instruction" presents various instructional theories and underlying principles. His approach seems to be comparable to our perspective which is presented by German authors [12][14]:

A practice is a specific instructional activity. A program is an approach consisting of a set of prescribed practices. A principle is a relationship that is always true under appropriate conditions regardless of program or practice. Practices always implement or fail to implement underlying principles whether they are specified or not. Instructional approaches may facilitate the implementation of one or more instructional principles. [18].

The meta-model we present does take into account not only the most basic level but also higher levels of the presented top-down-model. In order to solve the need for dynamic classification, the meta-model includes the additional concept of *roles*.

5. INSTRUCTIONAL ROLE AND INSTRUCTIONAL APTITUDE

Using LOM metadata we cannot specify the instructional aptitude of a learning object. Is a learning object suitable to be used in a scenario of collaborative learning or in a scenario enabling problem solving? Metadata should be useable to specify instructional aptitude at any level of abstraction as explained in the previous chapter: models, theories, principles, even epistemology. We will demonstrate and substantiate this by two use-cases, elaborating the level of instructional models and learning theories in the following.

5.1 Learning Sequences – Learning Processes

In separating content from structure, learning objects are decontextualized. In order to advice the recontextualization of content for learning, learning objects should be integrated in learning strategies, learning processes or sequences (such as case studies). We already stated that learning processes are not addressed by LOM. In our meta-model, learning objects are integrated into different learning cycles supporting processes which are derived from different instructional models. In the role-concept of our meta-model learning theories and instructional models represent context. Instructional models define instructional phases within a learning cycle.

Merrill stresses the importance of phases in learning cycles and states common instructional phases in PBL:

Many instructional models design environments which involve students in distinct phases of learning. Each model determines a set of specific phases. Each phase is part of a learning cycle and involves important, often implicit components of effective instruction (…) Many current instructional models suggest that the most effective learning environments are those that are problem-based and involve the students in four distinct phases of learning: (1) activation of prior experience, (2) demonstration of skills, (3) application of skills, and (4) integration of these skills into realworld activities. [18]

We present two examples in order to illustrate the conceptual model. In these examples we focus on two different epistemological approaches: cognitivism and constructivism. Principles are Expository Teaching (according to Ausubel [2]) and PBL.

In our meta-model any phase of learning represents a specific instructional role. Learning objects (types) fill different instructional roles within learning processes or learning cycles set up by different learning theories or instructional models. One and the same learning object may fill different instructional roles defined by different instructional models and learning theories or derived from various instructional principles.

Our concept of roles stringently and clearly distinguishes the natural types of learning objects (media type, tools e.g.) from their instructional role/purpose [6][23]. The Teachware-specific Meta-Model in Learning Material Markup Language LMML [24] defines Motivation as well as Example, Exercise, Question, Table, List, Multimedia and others as instances of ContentObject. But from the perspective of instructional design Table, List and Multimedia elements are media types or different types of illustration which are contained in the curriculum. These types fill, for instance, the role *Example* or *Motivation*. Categories of LOM do not address a main task of instructional design: the support of learning processes respectively cycles of learning. There are different ways for modelling learning sequences. The selection of a learning sequence is based on instructional principles and is epistemology focused. Learning theories and instructional models suggest to involve the students in distinct phases of learning.

The top-down-model can be mapped to the concept of types (class) and roles as shown in figure 5.

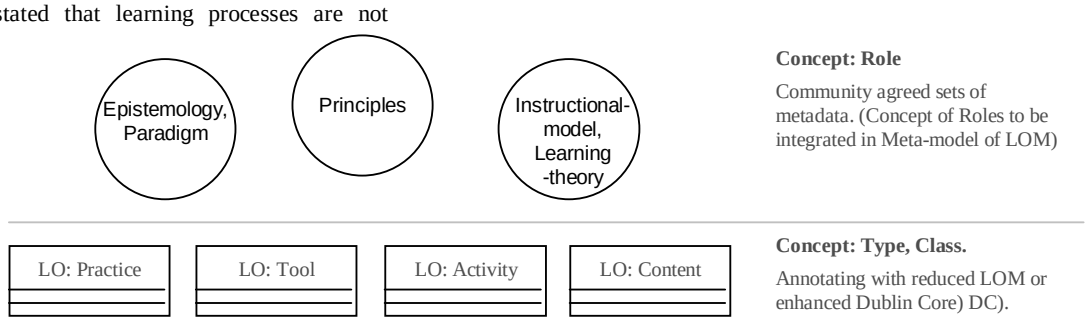

Figure 5. The model distinguishes roles from types/classes.

5.2 Roles for Modelling

There is a wide choice and diversity of definitions of the role concept in literature. In this paper we will not examine more closely the different meanings and uses of the role concept which has been elaborated in [22]. Here we will focus on the definitions relevant for our purpose. Steimann distinguishes definition of characeristics from the player itself: *A role is a kind of protocol specificification specifying behaviour and characteristics, but not the role player itself* [23]

As opposed to natural types or classes, roles have strong dynamic aspects. Types/classes, which are the fundamental concepts in the object oriented modelling are inherently static: an instance of a class once and forever belongs to that class – it cannot change it without loosing its identity. An HTML-page for instance will always remain an HTML-page; removing its tags makes it a degenerated HTML-page, but an HTML-page nonetheless. On the other hand, the same HTML-page may fill different roles in the same instructional model or in two different instructional models. Let us map these definitions to the educational terminology. A learning object may play different roles within different instructional models and within the same instructional model.

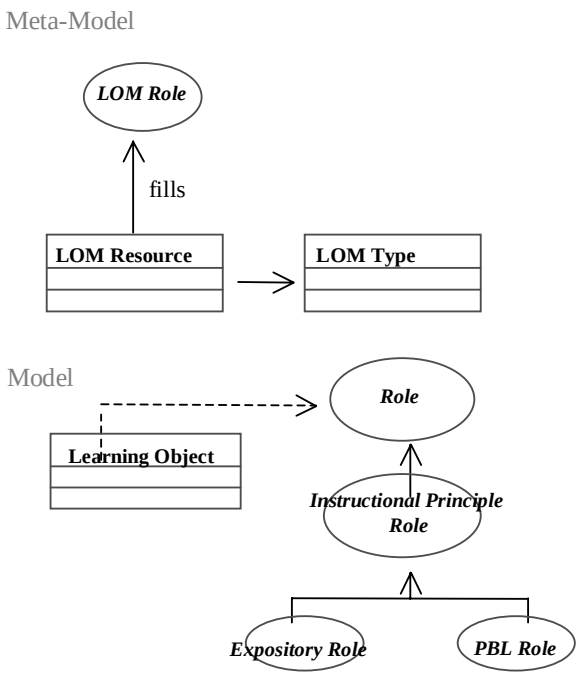

Figure 5. The extended LOM Meta-Model.

In the following section we will use the Unified Modelling Language (UML) to model two instructional models or learning theories. Figure 5 shows the LOM Meta-Model extended by the role concept. We defined a new concept "Instructional Role" as a subclass of the general class "Role". In this chapter we will focus on two instructional principles: Expository Teaching and PBL [26]. Thus we define two subclasses "Role of Instructional Principle – Expository Role" and "Role of Instructional Principle – PBL Role". For each further instructional model, principle or paradigm we can define new subclasses of the concept "*Instructional Role*". Learning Models, instructional principles and paradigms are used as context of roles and may determine relationships between entities.

In fact metadata sets according to specific roles are to be set up and agreed upon by communities of practice and scientific communities in regarding fields. Standardization initiatives may moderate these processes. These processes will not be easy as standardization itself is hard work. But in advance, LOM could be reduced to less attributes. We suggest to remove the Category 'Eductional' and some others and address instructional and educational information at the level of specific roles.

Models carefully describe the instructional function of each phase within a learning process. We refer to phase plus specified function as instructional role. Used in such a way, the instructional role is compatible with the idea of the role concept: a type must have certain characterising predicates [7], qualities, attribute, or requirements in order to be able to fill a certain role. Characterising predicates, attributes and requirements are matchable with the concept of instructional aptitude explained in the beginning of this chapter. We suggest to name instructional aptitutes 'instructional qualities'.

Here we only present two use cases for better understanding of the concept of Instructional Roles. These use-cases do implement the instructional principle Expository Teaching as well as PBL by specific models.

5.2.1 Learning Sequence and Phases according to Ausubel's Expository Teaching

5.2.1.1 Learning Theory

Ausubel's theory is a cognitive learning theory. "The model of cognitive organization proposed for the learning and retention of meaningful materials assumes the existence of a cognitive structure that is hierarchically organized." [2]. Ausubel's theory deals with how learners learn large amounts of meaningful material from textual presentations. According to Ausubel, learning is well organized by superordinational, representational, and combinatorial processes that occur during the reception of information. "A primary process in learning is subsumption in which new material is related to relevant ideas in the existing cognitive structure on a substantive, non-verbatim basis. Cognitive structures represent the residue of all learning experiences; forgetting occurs because certain details get integrated and lose their individual identity." [11]

According to Ausubel a learning sequence consists of four learning phases: (1) advance organizer, (2) progressive differentiation, (3) practice and (4) integrating (Ausubel's Expository Teaching).

5.2.1.2 Roles according to Ausubel's Expository Teaching

A given learning object (type) fills a precise role within a learning phase. A learning object can play different roles within a given learning sequence. For instance a text or video-file presenting a case can be used in the first phase called "advance

organizer" as motivation for the learner but can also be used in the phase "practice" as an "apply practice element" in another course.

Table 1. Phases of Expository Teaching according to Ausubel

Phase	Instructiuonal purpose
Advance Organizer	Prepare for integration of new knowledge. Subsuming bridge between new learning material and existing related ideas. Present introductory material that helps students relate new information to existing knowledge schemes. New ideas and concepts must be "potentially meaningful" to the learner. Help to relate new ideas to existing scheme. Ask questions like: What do you want to find out? What operations do you need to perform to get there? What do you already know?
Progressive Differentiation	The most general ideas of a subject should be presented first and them progressively differentiated in terms of detail and specifics. Organize new material by subordination, superordination and coordination.
Practice	Practice and apply
IIntegrating and Connecting	Integrate and link new knowledge to other fields of knowledge and context areas as well as to the advance organizer. Instructional materials should attempt to integrate new material with previously presented information through comparisons and cross-referencing of new and old ideas

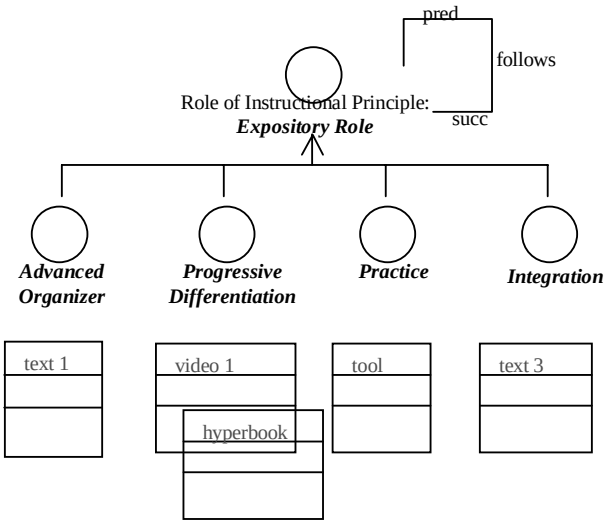

Figure 6. Typical Scenario according to Ausubel's Expository Teachning.

5.2.2 Problem Based Learning

5.2.2.1 Instructional Models for PBL

Many instructional models are concerned with Problem Based Learning. Most of them refer to various approaches of constructivism. For standardization it may be useful to identify and model common phases which are existent in many models. Referring to Merrill these are "(…) (1) activation of prior experience, (2) demonstration of skills, (3) application of skills, and (4) integration of these skills into realworld activities." [18].

On the other hand use-cases can be derived from specific instructional models and do exactly fit into local instructional practice. Our use-case is derived from the "Konzept der mehrperspektivischen Technikdidaktik" (concept of multi-perspective instruction in the education of engineering) [20] and an instructional model based on this concept [26].

5.2.2.2 Roles according to PBL

A learning object can play different roles within different learning sequences modelled according to different instructional models. For instance a text presenting a theory can be used in the phase "advance organizer" (roles according to Ausubel) as well as in the phase "Generalize" (roles according to PBL).

Table 2. Phases within a scenario of PBL

Phase	Instructiuonal purpose
Goal Description	Present problem to be solved. Set ultimate Goal
Specify Criteria	Specify one or more criteria your solution should meet. What aspects do you want to focus on. How do you know you reached your goal?
Background Knowledge	Identify knowledge needed. Sample and share knowledge. Ask experts.
Generate Ideas	Generate ideas. Draft provisional hypothesis.
Implement Solution	Generate and develop solution. Implement. Compare different solutions
Reflect	Evaluate solution, reflect solution, reflect product, reflect process.
Generalize	Conceptualize, integrate, and generalize your knowledge. Exchange from example into theory.

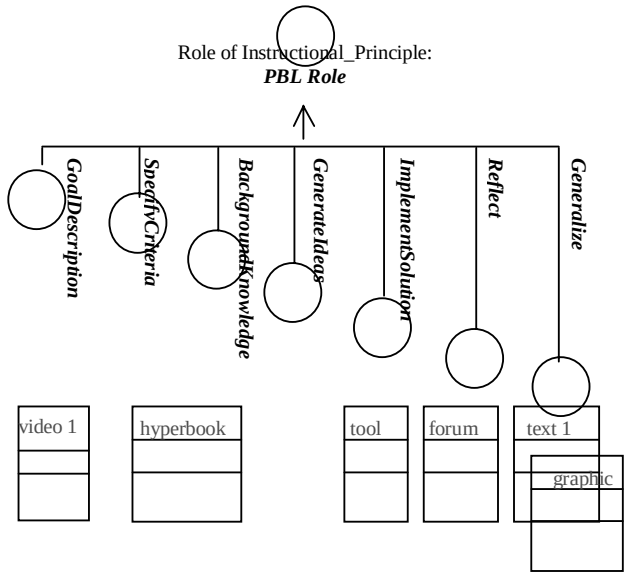

Figure 7. Typical Scenario of PBL.

6. SUMMARY – FURTHER WORK

Motivated by the lack of instructional information in the current LOM standard, this paper presented a short analysis of this deficiency and showed how the concept of didactic roles can be used to extend the current LOM standard to include this missing

information. The important advantage of this approach is its ability to deal with dynamic modelling and instantiation, in contrast to a standard class-oriented approach which is suitable for the static attributes currently included in LOM. We presented two use-cases which take into account two different learning models and specified the corresponding Instructional Roles for these models. The presented use-cases are very specific. They explain the idea of integrating the role-concept in object-oriented modelling within learning environments.

Integrating Instructional Roles in standards must ground on broader and agreed sets of attributes addressing different instructional principles, learning theories and paradigms. We currently work on an exemplary set of metadata for an Instructional Role called 'Situated Learning'. And we will recommend an reduced set of categories within LOM.

We apply both to the Open Learning Repository (http://www.kbs.uni-hannover.de/~allert/olr/studie4/site/). Its design is guided along the idea of 'Communities of Practice' (CoP) as well as PBL.

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Structural Models for Interactive Drama

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ABSTRACT
We are designing computer programs for Interactive Drama, where the audience can act to modify the story while the computer responds to these acts and maintains the narrative nature of the experience.

Such computer based Interactive Drama requires narrative models able to both simulate the narrative on a deep level, and allow the user to interact with it.

We discuss in this paper the extent to which structuralist models are useful for this purpose. Then, we describe our own computer model and its structuralist sources. Finally we discuss the limits of Structuralism for our model.

General Terms
Algorithms, Design, Human Factors.

Keywords
Interactive Drama, Interactive Fiction, Interactive Narratives, Structuralism, Narrativity, User Model.

1. INTRODUCTION TO INTERACTIVE DRAMA
The interactive nature of computers opens the way to a new narrative genre where the audience can interact with the narrative. While several forms of such interactive experiences do exist (interactive fiction, video games, etc.), it is admitted that none of the above let the user interact deeply with the story itself.

We will call *Interactive Drama*, a drama on computers where the user is acting as one of the characters (the protagonist), and where his/her actions modify the story itself, while maintaining the narrative aspect of the drama.

Whether Interactive Drama is possible or not is controversial. We will not discuss this issue here. More practically, we are involved in the design and implementation of a software system for Interactive Drama [18][19]. Our system, called IDtension, has been inspired from several structuralist theories. The goal of this paper is to discuss the following:

- How and why Structuralism should be used for Interactive Drama in general?
- What are the choices for the particular IDtension system?
- Why Structuralism is not sufficient for the IDtension system?

Before discussing Structuralism we need to present our vision of Interactive Drama. Each Interactive Drama needs a model of narrative. The challenge of Interactive Drama is to find a model suited to the interactive nature of computers. According to J. Murray[14], computers are procedural, which means that a good computer model of narrative should be an *engine* able to *produce* a narrative. However many models of narrative are descriptive rather than procedural (see for example the three act structure): they describe narrative as a given temporal succession of events. Even if it is possible to follow such temporal models to make Interactive Drama (see for example the project described in [12]), we believe that in the long run Interactive Drama should be based on a real simulation of drama. Thus our goal is to find a procedural model of narrative, and to allow the user to interact with it.

2. CONTRIBUTIONS FROM STRUCTURALISM
We find in Structuralism the response to our quest for a procedural model.

Indeed, structuralists have described anthropological entities like myths or narratives in terms of structure instead of a sequence of events.

For example, Greimas represents the meaning as a reduced network of oppositions and contradictions, which is an abstract description that goes beyond the linearity of narrative [8]. One the other hand, his description of narrative in terms of "actants" remains at a level where structure prevails over time.

The analysis of myths by C. Levi-Strauss [10] follows the same principle of reducing time to structure as stated by D. Andrew: "for Levi-Strauss the world of stories is solely a mechanism of forces and relations" [1].

Such structural and non temporal description of narrative opens the way to a procedural model of narrative simulated on computers.

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Germany

According to Levi-Strauss: "L'ordre de succession chronologique se résorbe dans une structure matricielle atemporelle" (The order of chronological sequencing is reduced in a matrix and non temporal structure) (Levi-Strauss 1960, cited in [5]). The role of the computer is to:

- model such an a non temporal structure;
- simulate this structure to unfold the chronological sequence of events.

If we examine closely the structuralist models, two features are of particular interest for Interactive Drama:

First, the structuralists have introduced the very idea of a function: an action defined from the intrigue point of view [15]. Thus Structuralism focuses directly on the meaning of actions, from the story's perspective. Applied to Interactive applications, this provides a clear distinction between realistic virtual environments, which imitate the real world (see Artificial Intelligence based characters in realistic virtual worlds), and Interactive Drama, which aims at conveying meaning through a narrative: "La passion qui peut nous enflammer à la lecture d'un roman n'est pas celle d'une vision […] mais celle du sens." (The passion that evolves at the reading of a novel is not that of a vision, but that of meaning) [3]. Current trends in Interactive Drama confirm this evolution towards a global view of Interactive Drama [13].

Second, structuralist theorists do formalise their approach, modelling transformations in narrative with predicate based logic (see in particular [8][20]). This kind of formalism is suited to a computer simulation even if the transcription from theory to computer programming is not straightforward. This will be discussed in the next sections.

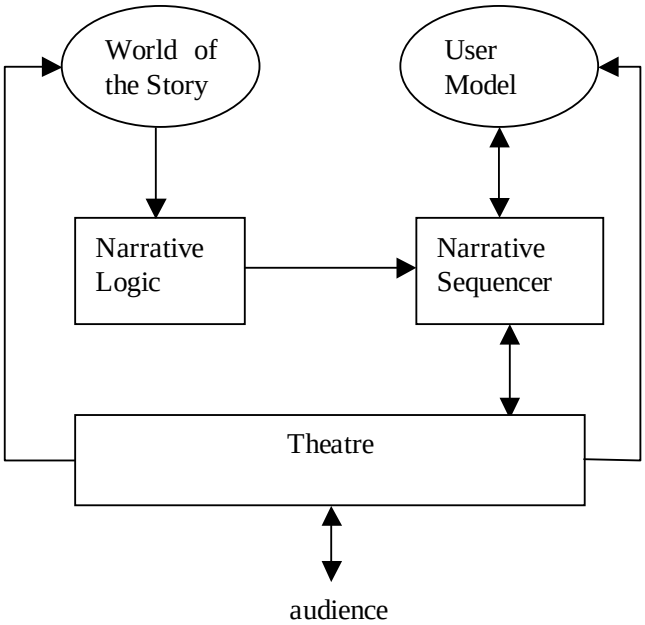


Figure 1. Insert caption to place caption below figure.

3. GENERAL DESCRIPTION OF THE IDtension SYSTEM

The general architecture of The IDtension system is shown on Figure 1.

The "World of the story" contains all information about the current state of the story :

- basic elements contained in the story : characters, goals, tasks, obstacles
- states related to characters: characters's wishes, knowledge, opportunities for action, etc.
- facts concerning the material situation of the world of the story (for example: a door is closed).

The role of the Narrative Logic is to calculate from the data stored in the "Word of the story" the set of all possible actions of the characters at a given time in the narrative.

The Narrative Logic manipulates a set of rules. For example, the following rule applies to a situation where a character is informed that he could perform a certain task:

```
IF
        CAN(X,a)
        ~KNOW(X,(CAN(X,a))
        KNOW(Y,CAN(X,a))
THEN
        Inform(Y,X,CAN(X,a))
```

All these possible actions are then processed by the Narrative Sequencer. This module filters the actions in order to rank them from the most valuable to the least valuable. For this purpose, a series of *needs* has been identified. By "need", we mean a narrative-related emotional or cognitive variable that must be maintained at a certain level in order to make up a good drama.

The narrative sequencer uses a general strategy to satisfy these needs, and uses the User Model.

The role of the User Model is twofold:

- estimate the user's "need" when those needs vary in time
- simulate the impact on the user of each possible action.

The narrative sequencer chooses the action whose the simulated impact best matches the user's "needs", at a given time in the narrative. For example, if a surprising event is calculated to be valuable, then such an action is looked for within the set of all possible actions provided by the Narrative Logic.

We have identified the following needs :

Table 1. Narrative needs in the model

Need	Description
Consistency	The action is consistent with previous actions of the same character
Conflict	The action expresses an internal conflict
Demonstrativeness	The action shows the values of a character
Variability	The action is different from previous one(s)
Surprise	The action is unexpected
Forward going / progression	The action keeps the story moving forward
Suspense	The action promotes suspense.
Spectacle	The action provides a pleasant spectacle to the audience

Such kind of narrative variables are also used in [2]: a complex user model is proposed as a new approach to story generation.

Several of these needs refer to a central concept in our system: the narrative values. Values are thematic axes according to which each task is evaluated: honesty, friendship, family, fraternity, etc. They are stored in the user model. As an example, the conflict arises when performing a task which does not match the character's values is necessary to reach a goal.

The User Model will also be adaptive, in the sense that the character's attachment to values will depend on the user's actions [19].

The theatre is then responsible for displaying the action(s). It also manages the interaction between the computer and the user. At this point, the interface is purely textual, but it will be of graphical nature in the future (typically in Real Time 3D).

Currently, the user interaction is organised as follow:

1. the set of all actions the protagonist can perform are suggested to the user
2. the user chooses the action he or she wants to perform
3. the action is performed on the computer
4. the computer calculates the best next action to be performed by a different character
5. the computer performs the action

This cycle is repeated until the end of the story.

But several variant can be tested within the system. For example, several actions can be played by the machine. Or only a subset of actions could be proposed to the user. We have also implemented a non interactive mode, where the whole story is generated automatically.

4. STRUCTURAL COMPONENTS OF THE IDtension PROJECT

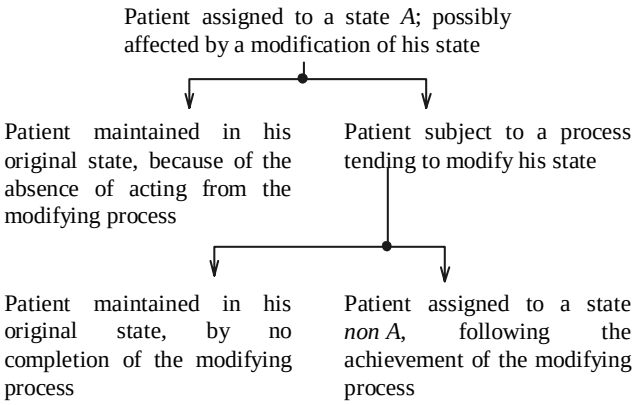
We will detail here one component of the system, the Narrative Logic, because it is where Structuralist theories have been used. A more detailed description can also be found in [18].

We have shown how Structuralism fits Interactive Drama needs. Since there is no unified structural theory of narrative, many options were available in order to apply it to IDtension. We have made some choices but we do not pretend to claim that it is the best or only choice. An interesting alternative, based on Greimas' ideas, is shown in [17].

We were inspired by Claude Bremond's theory of narrative. There are several reasons for this choice:

- In the introduction of his book [5], C. Bremond writes: "est-il possible de décrire le réseau complet des options logiquement offertes à un narrateur, en un point quelconque de son récit, pour continuer l'histoire commencée?" (is it possible to describe the complete network of choices that are logically given to a narrator, at any point of his narrative, to continue the story?). This is exactly this question that arises in Interactive Drama.
- as stated in [4], these "choice points" correspond to the expectations that the audience creates during the narrative. Thus, the "choice points" seem to be the good level of interaction.
- Bremond's logic starts from Propp's model [15] but goes further, allowing rich narrative with several intertwined narrative sequences. In [11], the Propp's model is adapted successfully to the computer, but in the context of "story creation", which is slightly different. Furthermore, their work [11] addresses tales for children, which are exactly the kind of story that inspired Propp's model. For our more general approach, Bremond's model is the natural extension of Propp's model.
- Unlike Greimas semiotics, Bremond's logic provide a detailed description of the multitude of actions which occurs in narrative. It thus seems more directly applicable to computers.

Bremond splits a narrative into a succession of processes that modify some narrative roles. For example:



There are more than 50 of such processes and we took into consideration only a few of them. Bremond's logic constitutes a huge repository of narrative processes which will enable us to enrich the model in the future.

Our logic is also inspired from the "narrative transformations" proposed by T. Todorov. This is a more formal approach where actions are represented as predicates which transform some propositions [20].

As a result, we build a narrative logic that handles the following entities, belonging to the World of the Story :

- Goals: States in the world of the story that characters want to reach
- Tasks: Concrete activities which lead to the goal
- Obstacles: practical elements in the world of the story which hinder some tasks
- Characters: entities which have goals and perform actions

The model makes a clear distinction between goals and tasks, which respectively correspond to the ends and the means in Bremond's logic.

The Narrative Logic produces actions: what characters do, including information transmission, influences, tasks accomplishment (acts) and sanctions.

Actions correspond to Bremond's processes. We currently implemented the following types of actions:

Table 2. Actions in IDtension

Action	**formal form**	**Description**
Informations	Inform(X,Y, PREDICAT)	*X* informs *Y* that … ANY PREDICAT
Influences	Incite(Y,X,a)	*Y* incites *X* to perform *a*
	Dissuade(Y,X,a)	*Y* dissuades *X* to perform *a*
Decisions	Accept(X,a)	*X* accepts to perform *a*
	Be_tempted(X,a)	*X* begins to accept to perform a (then he hesitates to perform *a*)
	Refuse(X,a)	*X* refuses to perform *a*
	Renounce(X,a)	*X* renounces to perform a (then he hesitates to perform *a*)
Acts	Perform(X,a)	*X* performs *a*
Sanctions	Congratulate(Y,X, a)	Y congratulates X for having performed *a*
	Condemn(Y,X,a)	Y condamns X for having performed *a* (because of a value of Y violated by *a*)

Some other actions will be implemented soon. For example, sanctions are currently only verbal (congratulations and condemnations), but there will also be concrete rewards and punishments.

In the current version of IDtension, the Narrative Logic is composed of 24 rules.

This set of rules is a very simplified view of Bremond's transition diagrams. We know that this is not the final set of rules. In the near future, we will explicitly group these actions into a process. Such groups can be compared with the notion of beats used in [13], an action-reaction couple, although beats are used at a lower level.

5. ABOUT NON STRUCTURALIST COMPONENTS OF THE IDtension PROJECT

Beyond the fact that the user model approach is a good answer to the need of an audience oriented approach to narrative [9] and interactive narrative [16], the question we would like to raise is the following: To which extent the user model is a consequence of a limit of Structuralism applied to Interactive Drama?

Obviously, there are limits in particular structuralist models for the purpose of Interactive Drama: they are not unified; they are not perfectly formalised, they are not designed for computers neither for interactivity. But the question is whether there is a fundamental limit of the application of Structuralism to Interactive Drama, whether the user model can or cannot be reduced to a structural description of narrative.

It appears that structuralists themselves acknowledge some limits in their analyses. For example, Bremond explains, in the conclusion of his book, that there is no narrative text that could be reduced to its intrigue [5]. Commenting on the structural analysis of narrative, Barthes writes that a very large number of narrative functions cannot be mastered by narrative analyses, which focus on the large sequences of the narrative [3].

Three interrelated questions remain unanswered:

- how a single sequence is temporally organised, with regards to the duration of time, beyond the ordering of its elements? Barthes describes that the sequence is expanded and distorded, but does not explain how [3].
- How the sequences work together? Some types of combinations are described for example by Bremond ("one next to the other", "enclave") but the global organisation is only described metaphorically in musical terms by Barthes ("le récit est fugé" – "the narrative is like a fugue"), in chemical terms by Bremond ("entre les séquences, un jeu d'affinités et de répulsions s'institue, comparable à celui qui règle en chimie la combinaison des corps simples" – "between the sequences, an interplay of affinities and repulsions takes place, similar to the chemical combination of elements").
- Why one sequence follows a certain route versus another? Bremond describes stories in terms of "choice points", but he does not answer the question of how to choose between one branch or another.

Could such detailed sequencing be described in a structural way? There exist rules in music which describe some inter-sequence relations, called the rules of harmony. However equivalent narrative rules would be different. Contrary to music, one cannot assert a priori that two elements of two narrative sequence fit together. It all depends on the temporal context, thus on the whole narrative.

What dictates this inter-sequence temporal organisation is something that is not part of structural analysis and could not be: the emotional dimension.

The emotional dimension must be simulated dynamically because of its temporal nature, and the equations for this simulation, as for many simulations, cannot be "solved" in order to produce a set of structural rules.

Thus, everything that relates to the pacing of a narrative – and we know that filmmakers do work on that dimension- is not in the scope of structural analysis. Neither is it possible to describe how several plots should intersect in structural terms.

For example, structuralist theories do not take into consideration the fact that at a certain point in the narrative, the introduction of a surprising event is valuable. A structural model of surprise is not feasible.

The thesis of Noël Carroll on fiction perception confirms the central role of emotion in the narrative. According to Carroll, the role of Emotion is to focus the audience's attention on important features of the fiction: "Emotions are a central device that authors have for managing the attention of readers, listeners and viewers. […] our emotions keep us locked on the text on a moment-to-moment basis" ([6] p. 235).

Thus, the structural analysis gives us tools for writing stories in terms of structural, non temporal elements and provides basic units that must be assembled to constitute a narrative. But the precise way these units should unfold in time is treated as a separate issue.

That is why our Interactive Drama architecture is composed of both a structural part (World of the Story and Narrative Logic) and a user centred part (Narrative Sequencer and User Model).

6. CURRENT AND FUTURE DEVELOPMENTS

We have ran simulations of a first version of the IDtension system. This version allowed us to test the global architecture of the system but results are still insufficient to demonstrate the system, because the stories produced need improvements. That is why we are developing a new version, which will successively include :

- better management of obstacles
- better management of goals and tasks
- better modelling of conflict
- modelling of suspense
- spatial dimension of drama
- integration into a graphical system.

In addition, we are working on the scenario writing process. Indeed, an object oriented language does not prevent a programmer to develop traditional procedural programs. Similarly, providing IDtension to writers is not sufficient to guarantee strongly interactive drama. We are thus working on elementary structures made with goals, tasks, obstacles and values which are capable of exhibiting strong interactive experience.

7. CONCLUSION

We are developing a system for achieving the ultimate goal of Interactive Drama: deeply combining interactivity and narrative.

To achieve this goal, we borrowed a lot from the structuralists' analysis of narrative in order to build a procedural model of narrative able to convey the very meaning of the narrative. But the IDtension architecture contains non structuralist elements, enabling it take into account the emotional dimension.

As a result, IDtension is a complex and hybrid system. We believe that true interactive drama cannot be achieved with an single easy mechanism. The work of C. Crawford, involved in

Interactive Drama for several years, supports the above statement: "Any story telling software must be equipped with algorithms with great complexity before it can yield any interesting results" [7].

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UZUME
A performative Event In Virtual Reality

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ABSTRACT
Immersed in *Uzume*, a sensitively responsive, dynamic environment surrounds the visitor, unfolding the communicative nature of a strange, virtual entity. Yet, participants are not able to directly control the environment's evolution and need to develop a playful gestural dialogue with the abstract, virtual opposite.

The work addresses the aspects of presence, control, reflectivity, and otherness as they develop in an immersive, responsive environment. Users are confronted with a chaotically evolving, spatial entity, whereby the process of their perception and interpretation of its appearance and behavior alternately veils or unveils the underlying computer system.

This paper provides an introduction to the theoretical, conceptual and architectural levels of *Uzume*. The performative experience, along with the evolving dialogue between the user and the environment, will be the main focus of exploration.

General Terms
Performance, Experimentation, Theory.

Keywords
Virtual Reality, virtual environment, CAVE, art, presence, performative, control, dialogue, mirror, other, chaos.

1. INTRODUCTION
Uzume is named after a Japanese Shinto goddess and means 'whirling'. The story of Uzume tells of her strange dance that lured the sun goddess Amaterasu out of the cave where she had hidden herself.

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Germany

Uzume was implemented for a 4 to 6 wall CAVE® projection environment. Visitors are invited to physically move around within the projection space, and are equipped with two hand sensors and tracked shutter glasses. The sensors' positions are constantly sent to the VR system, which is thus provided with a limited possibility to 'perceive' its users.

The aspects of this projection medium that initially attracted me, are the human-scaled physical projection space and the ability of the VR system to update the content in real-time. During the working process, the focus shifted more and more towards the communicative aspects of this ability and the relations of input and response. Thus, the most interesting quality of this projection space is the physical integration of its inhabitant in the evolving progress. It is the 'observing' (tracking and processing) capability of the computer-controlled system that permits the viewer to be 'present' and involved. The evolution of the environment becomes thus an individually characteristic event. In the following sections I will discuss the performative, as well as the critical aspects of such a dialogue.

Figure 1. CAVE® shot 1

2. STRUCTURAL LAYERS

The appearance and behaviors of *Uzume* evolved in the idea of a space that forms and changes dynamically over time. During the process, the question of controlling —or rather not controlling– the evolution of this space, but still being able to intuitively take part in a situation, driven by mutual influence, became the most important aspect of designing its architectural layers. Following are the four different sets of instructions, each of which is modulated by the movements of the visitor.

2.1 Temporal behavior of dynamic systems

The whirling structures are based on spatial representations of the temporal behavior of nonlinear, chaotic systems, so called 'strange attractors'. Their parametric fields are spatially mapped around the user's body, and hence, by gesturing with their hands, they actually traverse the various chaotic states of the system.

2.2 Fluid-like force field

The attractors, as well as the users, are embedded in a viscous fluid-like force field that displays the 'medium' of this environment. It sensitively reacts to the physical presence of the visitor, thereby displacing and locally transforming the visible, chaotic patterns.

2.3 Sound space

The basic modules of the spatial, real-time composition consist of various discrete voices, whose compositional parameters are spatially mapped around the user. They become combined and modulated by the movements of the participant.

2.4 Choreographic rule-based system

The choreographic 'layer', whose decisions are indirectly influenced by the behavior of the user, controls the temporal conditions and initial properties of simultaneous events, as well as the transitions between these configurations.

Figure 2. CAVE® shot 2, force field and attractor

3. THE PLAY

3.1 Performative Aspect

The chaotic behaviors of nonlinear systems, as well as the complex conjunction of all architectural layers (2.1) confront the participants with a system that they will never be able to fully comprehend, and that thus defies control, and any form of colonization.

In that any emerging moment is ambiguous and neither previously given, nor explicitly deducible, each moment represents a singular event –and yet only one point in an infinite evolution. The performative quality unfolds exactly in this dynamic interrelation, as each (inter)action is undirected and each sequence becomes arbitrary, without pursuing any specific interaction/control purpose. The subject of the encounter consequently results in the whole, the interconnection of all events.

3.2 Process of identifying

The spectators become players, who identify themselves with the situation, and attribute some form of liveliness to the unpredictable evolution of the environment. Thereby the willful behaviors of *Uzume* seem to counterbalance its rather abstract appearance. The mode of our perception, based on which we apprehend and interpret patterns by networks of associations, rather than mathematically or geometrically related terms, becomes quite apparent during the process of identifying.

3.3 Vision of Control

Since it would be illusory to assume that the 'virtual' opposite wouldn't gain any influence over the visitor, the relationship in this projection space evolves in a mutual interrelation. Yet, the users interact not only with the idea and its realization, but also inevitably engage the underlying control system. Paradoxically they have a much better chance to succeed in interacting and controlling, the more powerful this control system is.

The desire for an ultimate control system seems inseparable of the idea of highly advanced VR systems. As for pioneers, Ivan Sutherland euphorically states in 1965: "The ultimate display would, of course, be a room within which the computer can control the existence of matter." [1] Myron Krueger, working on interactive, computer-controlled installations since 1969, envisions: "Imagine that the computer could completely control your perception and monitor your response to that perception. Then it could make any possible experience available to you." [2] Control is the magic key -- on the other side of the system is the user, who seeks to control the environment.

3.4 Oscillating opacity of control system

A control system of such capability, of course, must be able –and permitted-- to thoroughly observe, analyze and interpret our actions.

In my work, the ambiguity of such visions becomes an oscillating interplay between masking and unmasking. As mentioned above, a system, which behaves so variably and unforeseeably, and yet which cannot be determined by its visitors, lends a sense of life to the computer-generated situation. Combined with the rather abstract appearance of this 'entity', the subjective perception becomes thus the degree of the opacity that this illusion can gain.

Meanwhile, I watched several hundred visitors develop a form of emotional relationship to their computer generated opposite and observed them talking to or yelling at these whirling lines. Often there's a moment, when the visitor starts smiling --the kind of smile that one smiles when caught talking to oneself. That's the moment, where the usually transparent borderline between the play and the underlying control system becomes opaque to the user –and they are thus able to cross it.

Figure 3. CAVE® shot 3

4. THE DIALOGUE

4.1 Transforming and distorting

"...an interactive technology is a medium through which we communicate with ourselves - a mirror (or, more precisely, a transforming) mirror" [3]

Based on Ovid's 'Metamorphosis', the artist David Rokeby examines how the image of one's self and the relationship to one's world gets reflected and transformed in interactive works. On the one hand he refers to the story, in which Narcissus sees his image in a pool of water and falls in love with himself. While the story, in which Echo, punished by Juno, is only able to repeat back the last words said to her, and consequently Echo only has the ability to transform Narcissus' words of rejection into an expression of her love, provides an example, where the input gets re-contextualized. "While the unmediated feedback of exact mirroring produces the closed system of self absorption (the reflection of the self is re-absorbed), transformed reflections are a dialogue between the self and the world beyond." [4]

4.2 Projecting and pretentious

Communicating with *Uzume* unfolds a process similar to pursuing a dialogue without being capable of the language of the other. Imbuing the mirror (4.1) with a 'projecting' quality shows the ambiguity of such a dialogue, in which the opposite reflects the quality of input by specifically changing the 'face', and yet the relationship between input and response isn't necessarily comprehensible and never is reproducible. The environment evolves to some extent self-independently and hence inversely challenges the user to explore its language. Input and response become thus a dynamic interplay, creating a communicative surface, in which users are able to discover themselves, as well as the other.

4.3 The other

The process of exploring or getting acquainted with the environment merely creates another, newly generated environment – an infinite sequence of configurations. Thus, the visitor is only able to approach the surrounding opposite in tiny steps, just enough to capture brief moments of intimacy, which again immediately dissolve in something unfamiliar.

Due to the chaotic nature, the evolution of the system seems almost open –despite of being defined by its code. Thereby a dynamic space is constructed, composed of an infinite number of boundaries –and thus impossible to grasp. The relationship, as well as its mirror image, remains thus always open, equal to something unconditional that can only be approached without being forced by rules.

Jorge Luis Borges describes such a fluctuating experience in his 'Book of Sand', a book that "has only one spine, but a hundred faces". [5] Turning the pages, one always discovers new ones, and when looking back, the preceding pages have mysteriously multiplied, becoming a labyrinth of possible sights and eventually resolve like fine sand.

Figure 4. CAVE® shot 4

5. CLOSING

Hereby, the virtual emerges from the substance of the relationship spanned ‘in between’ the projected space and its participant. Michael Heim, discussing the meaning of ‘interface’, provides with his interpretation of the ancient Greek term ‘prosopon’ an interesting metaphor for the independently evolving substantial quality of the ‘state in between’: “In ancient times, the term interface sparked awe and mystery. The archaic Greeks spoke reverently of prosopon or face facing another face. Two faces make up a mutual relationship. One face reacts to the other, and the other face reacts to the other’s reaction and so ad infinitum. The relationship then lives on as a third thing or state of being.”[6] In the zone between the (visually and acoustically) represented and the participant all modes of possible realities are coexisting. The dialogue as such creates thus an ‘interspace’ that unfolds beyond the third dimension, in which the virtual actualizes itself.

6. ACKNOWLEDGMENTS

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A Semiology of Video [1]

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I made a video trilogy during 1975-76: *Camera, Monitor, Frame* (1976); *Observer / Observed* (1975); and *Observer / Observed / Observer* (1976). The aim of this project was to create a Semiology of Video as a video work rather than a written text; it was completed after my series *Self Identity* (1972-74). The relationship between language and image, which was initially explored using "I" as the subject in *Self Identity*, is developed according to the logical structure of a video system dealing with the grammar of language at the same time.

I have presented these works along with an accompanying lecture at a number of universities and museums in the United States and Europe. Now I have a strong urge to put the logic of these video works into words. Since they were originally produced in English, I feel it is necessary to write in Japanese, recognizing differences between English and Japanese for both a Japanese audience and myself. Although my format is that of notes on a particular work, I hope its broader theoretical implication will be equally valid.

This essay primarily focuses upon "This is a camera 1" and "This is a camera 2," two segments of *Camera, Monitor, Frame*.[2] Several important differences between a Semiology of Video and a Semiology of Film are already apparent in these works. The reference point of "This is a camera 1" is *Kino Eye* by Dziga Vertov; for "This is a camera 2 " it is the propositions of Sergei Eisenstein's "word" theory along with Christian Metz's "sentence" theory. In the latter video, I have proposed a third alternative by comparing the structure of the Japanese sentence to my video work. This proposition may be hypothetical, but it is also a Semiology of Video analyzing the structure of a Japanese sentence. It differs from Eisenstein's montage theory which he also applied to the analysis of the Japanese ideogram (*kanji*). When I have presented this alternate proposition in the West, it has generated considerable discussion.

Observer / Observed was made before the other two works in the trilogy; *Camera, Monitor, Frame* followed; and *Observer / Observed / Observer* completed it.
Camera, Monitor, Frame nonetheless comes first thematically and served the role of introducing the other two works. Its title correctly implies that it is concerned with the basic objects of a video system. It is not intended to focus upon the mechanical or technical aspects of the camera or the monitor, but rather their role in the video system and their definition in terms of language. Therefore the limits of language are also examined relative to the image. As the intertitles "This is a camera" and "This is a monitor" indicate, this work deals with the logic of language and image in the definition of the objects.

Based upon an understanding of these objects, the *Observer...* works can then be located. The viewpoint has been shifted from that of the individual object to the structural problem of the video system in the interrelationship between the observer and the observed. It thus presents a structural viewpoint rather than dealing with the definition of an object. This may be demonstrated by the titles which depict relationships concerning both the observer and the one who is seen through the usage of the diagonal line (" / ").

I have utilized a linguistic approach throughout the trilogy. Compared to a series of images in which a picture takes on the character of a sign, a language possesses a much more logical structure. This is not to subordinate a language to a picture or vice versa, but instead to distinguish between two signs which have different characteristics. In actuality this is also explained by language, but I am seeking an approach which refers to both language and picture simultaneously. The way to do this is to articulate the picture as well as the language while regarding the picture syntactically like a language. One should not examine an individual picture by itself, but "read" the syntax and the morphology of the image. For language, I am likewise concerned with the sentence, not the individual word. (In the video there are word phrases which are not sentences in a grammatical sense; these are instances where the subject or the predicate, which constitute the sentence, is either hidden or omitted.)

The main themes of the video trilogy can be expressed in grammatical terms:

(1) A simple sentence that uses demonstrative and personal pronouns as its subject and an auxiliary verb as its predicate (*Camera, Monitor, Frame*)
(2) A complex sentence with relative pronouns (*Camera, Monitor, Frame*)
(3) The indefinite article, the definite article, and the infinitive (*Camera, Monitor, Frame*)
(4) The active voice and the passive voice of the verb (*Observer / Observed*)
(5) The positive and the negative of the gerund (*Observer / Observed*)
(6) The active and the passive voices of a simple sentence that uses a demonstrative pronoun as the subject and a verb as the

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Germany

predicate. Also, four combinations of the positive and negative forms (*Observer / Observed*)
(7) The complex sentence with a relative pronoun combined with a sentence which uses a personal pronoun as the subject and a verb as the predicate (*Observer / Observed / Observer*)
(8) A complex sentence with two relative pronouns and the active and the passive voices of the verb (*Observer / Observed / Observer*).

I will be discussing only the first two themes here. [2]

The above themes are all parts of a grammar. Another interesting approach would be to show grammatical differences within the same image. In other words, there are plural signifieds of the picture to the signifier in the same sentence.

As far as I know, there is no paper or work in film or video which attempts to analyze the relationship between language and picture in terms of individual cases of grammar. There are many theoretical works, including books by Christian Metz, which posit semiologies for film; video is still a young medium and has not yet received such analysis. I have read some of these theoretical treaties. Although they have enhanced my understanding of the topic, my video productions have taken quite a different approach. Metz, for example, analyzes the narrative of dramatic films. I am not concerned with drama. Instead, I have attempted to develop a semiological text within the framework of my video work, one which differs radically from the discussion of the sign in words. This is another approach to semiology, one which serves as an experiment with video as well as with semiology.

While Metz's approach to semiology is concerned with (dramatic) film, I deal with video, which has certain elements in common with film, yet has its own unique system. I am particulary interested in the structure of video functioning as a system. My work should not be analyzed simply for the pictures which appear on the screen and their accompanying sound. Instead it should be considered within the context of the image being manipulated through an entire system. In this way the structure of video as a closed circuit can then be comprehended.

Camera, Monitor, Frame (1976-1998)

This is a camera 1

The main theme of this work is the dialectic between the visual and the language. There are two propositions. One is "This is a camera"; the other, "I am Takahiko Iimura." The former is a definition for the object; the latter defines the subject. The theme of this work is to synthesize and combine two propositions into the dialectics of the visual and the language. In the first shot the sentence "This is a camera" is spoken to Camera 1 (No.1A; the shot references are all to Program No. of the chart). The spoken text is accomplished by a voiceover (unsynchronized sound). The next shot features the face of a person saying "I am Takahiko Iimura" (No.2C); it has a synchronized voice with lip movement. In the first shot, the speaker does not appear in the picture, so it is not known who spoke the words. It is technically possible that the second shot also uses voiceover; however, since it appears to be synchronized, an audience would generally assume that the speaker is identical to the person in the picture. In terms of identifying the voice, the only difference between the two shots is the existence of lips whose movement corresponds with the voice. Clearly there is a discrepancy between the picture and the voice. This phenomenon is often ignored in the narration of documentary films, but the identity of image and sound play an important role in my video work.

Let's return to our analysis. After presenting two propositions, Camera 1 is again accompanied by the voice which was heard in the first shot, again stating "This is a camera" (No.3A). Then the camera pans to white wall (no object), and the voice over states "This is not a camera" (No.3B). This is the opposite of the first proposition. A white wall which shown no object (no picture) may be defined in many ways. However, when presented in conjunction with the first proposition, its definition must negate the original. The visual relationship between the two is shown by the panning process. Panning, remaining within the same shot, retains the continuity of the same space / time; cutting disconnects the two. The shot itself moves from the presence of a camera to its absence. The text "This is not a camera" must therefore negate the original proposition. Normally the pronoun "this" is supplemented by the presence of an object, but there is no object in an empty space. One could also say "This is not a camera" when a face or another object appears; however, in an empty space the demonstrative pronoun loses the object. Yet no object - no picture is itself an object for "this" since there is no other reference. Thus the pronoun "this" signifies an object as well as no object.

In the next picture Camera 2 is accompanied by the voice once again stating, "This is a camera" (No.4D). Following a pan, the face reappears with a voice now saying, "This is not a camera" (No.4C). With the introduction of Camera 2 the setting becomes clear: two cameras face each other, and the person is seated next to Camera 2. The two cameras are panning each other. This setting is retained throughout the work; it is used to show the inter-relationship of the back-and-forth movement in the video. Camera 2 is identified by a number which has been attached to it, but is accompanied by the "This is a camera" voice which described Camera 1. The identical sentence has been voiced although it is referring to different cameras because it refers to the generality of the object, a camera; the difference is determined by visually reading the number. Thus the generality of language and the individuality of the object, or the abstraction of language and the concreteness of the object, are shown simply by the numbers "1" and "2" written on the cards. In addition to watching the picture and listening to the voice, the viewer must perform the third function of reading the card. Following the pan, the face with the synchronized voice says "This is not a camera," the same sentence which accompanied the empty space. This time, however, the speaker's subject is shown. In English, unlike Japanese, "this" can be used to identify a person as well as a thing. Unlike the instance of the empty space, "this" signifies the speaker; and unlike the "I" of "I am Takahiko Iimura," "this" objectifies the self. Thus far the positive statement "This is a camera" has been spoken three times, its negative twice. The picture, however, has differed every time except for shot 1A and 3A. This means that the identical sentence can accompany different pictures. In the case of the negative sentence there are endless verbal possibilities, but two propositions are set up initially to limit the scope of the object. The face saying "This is not a camera" completes the cycle of the first proposition concerning the positive and the negative.
Next the proposition "I am Takahiko Iimura" will be similarly interrogated. As in the previous case, the subject uses "this" instead of "I." Accompanying the picture of Camera 1, the voice says "This is not Takahiko Iimura" (No.5A). After a cut to the face, the voice says "This is Takahiko Iimura" (No.6C; sync sound). Like

the cutting between the first two propositions, this editing visually suggests each independent statement. The statement “This is Takahiko Iimura” combines the two propositions “I am Takahiko Iimura” and “This is a camera.” The demonstrative pronoun which is used for the camera becomes the subject in this sentence with the object being the proper name. “This” is spoken by the person in synchronized voice, and thus becomes an objectified statement.

The two propositions are then repeated, but now a picture of Camera 2 (No.7D) is followed by a pan to the face (No.7C). Unlike the earlier cutting, both propositions are located in the same space / time.

In the final shot (No.8C+D) the face appears in the left half of the screen with Camera 1 occupying the right part. Here the voice says (sync sound) “I am a camera.” This statement is the logical conclusion from the propositions developed up to this point. Both the person and the camera are in the same picture, and linguistically the subject “I” identifies with the object of the camera. If “I am a camera” were spoken as an independent

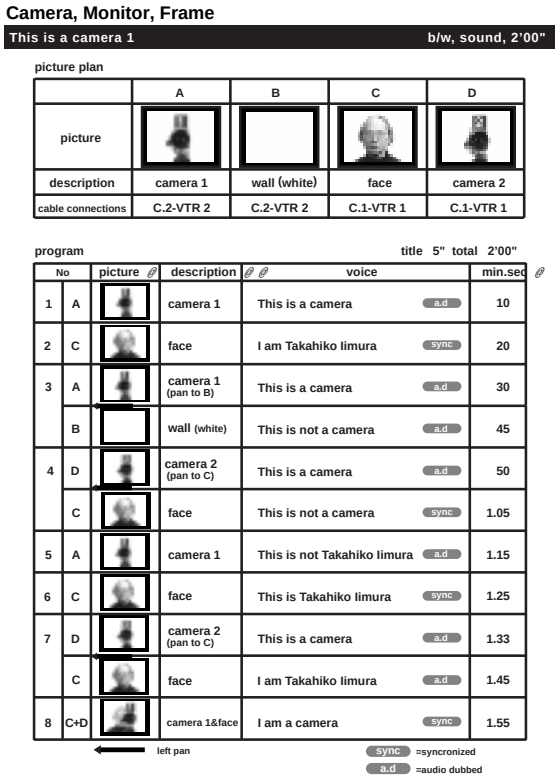


Chart 1. This is a camera 1

sentence, it would be a metaphor. Beyond this, moreover, the person who is looking through the camera is speaking, so the person and the camera (or, more accurately, the eye of the person has been replaced by the lens of the camera) have been combined and can be identified together.
This work consists of a set of two pictures of cameras along with the face of a person plus a final shot in which the person and a camera appear together. Altogether, there are eleven pictures, including three pannings, in eight actual shots.

On the other hand, the language of the work consists of four stages:

(1) the establishment of the proposition (No.1,2);
(2) the positive and the negative of the proposition and the exchange of the pronoun (No.3, 4, 5, 6);
(3) the representation of the proposition (No.7);
(4) the conclusion (No.8).

The two propositions could have been expressed in eighth different ways, including the positive and the negative and the exchange of the pronoun, but not all were used.

(1) This is a camera
(2) This is not a camera
(3) I am Takahiko Iimura
(4) I am not Takahiko Iimura
(5) This is Takahiko Iimura
(6) This is not Takahiko Iimura
(7) I am a camera
(8) I am not a camera

Expressions 1, 2, 3, 5, 6 and 7 occurred in “This Is a camera 1”; 4 and 8 did not.

The conclusion “I am a camera” is close to what Dziga Vertov suggested in his *kino-eye* writings [3] and his film *The Man With a Movie Camera* (1929). While Vertov’s essays are rather metaphorical, my conclusion is drawn from the dialectic between the two propositions. In *The Man With a Movie Camera* the cameraman often appears in the frame with the camera. There are also several double exposure shots featuring lens and the eye. On the metaphorical level, “This is a camera 1” owes much to him, but it follows the logical process of two propositions in the relation between language and image. In other words, my works attempt to achieve a dialectic between picture and sound recording of both synchronized and asynchronized voices against the picture. This was not possible in Dziga Vertov’s silent pictures.

This is a camera 2

This work is similar to “This is a camera 1” as two cameras are facing each other, but there is no person. The cameras pan each other, and the picture consists only of Camera1, Camera 2, and empty space. There is no synchronized sound, only voiceover.

The narrative of “This is a camera 2” begins with the sentence “This is a camera which shoots this,” The second “this” then becomes the subject of the next sentence, “is a camera which shoots this,” a repetition of the original sentence. It repeats itself endlessly like a loop. Such repetition is possible because “this” in English has the same form in both the subjective and objective cases.

In Japanese one says “Kore wa kore o satsueisuru kamera dearu kore wa kore o satsueisuru kamera dearu” (which translates very roughly as “This this shoot camera is this this shoot camera is”). Since the Japanese language does not have the cases of pronoun or relative pronoun, this has been translated into Japanese using the particles (words which define the role of a noun in a sentence) “wa” and “o” after “kore” (“kore wa” means “this” in the subjective case; “kore o” is “this” used as an object). A Japanese equivalent for the word “this” could not be switched from object to subject, so “kore” would need to be used twice. Another structural difference between Japanese and English is that in Japanese the subordinate clause comes first, followed by the main clause.

The structure of “This is a camera 2” is cyclic. The first shot begins with a picture of Camera 2 accompanied by the voiceover “This is a camera which shoots” (No.1B). There is a pause in the voiceover, and the object “this” is not spoken until the next image appears. The next shot begins with Camera 1; the same sentence is spoken (No.2D), beginning with the “this,” the object of the first sentence, which also serves as the subject of the following sentence. Next is an empty space; the object “this” of the second sentence is spoken (No.3A). Panning from the empty space to Camera 2 is accompanied by the sentence “is a camera which

Camera, Monitor, Frame

This is a camera 2 — **b/w, sound, 1'04"**

picture plan

	A	B	C	D
picture				
description	wall (white)	camera 2	wall (white)	camera 1
cable connections	C.1-VTR 1	C.1-VTR 1	C.2-VTR 2	C.2-VTR 2

program — title 5" total 1'04"

No		picture	description	voice (dubbed)	min.sec
1	B		camera 2	This is a camera which shoots	11
2	D		camera 1	This is a camera which shoots	16
3	A		wall (white) (pan to B)	This	20
	B		camera 2	is a camera which shoots	23
4	C		wall (white) (pan to D)	This	27
	D		camera 1	is a camera which shoots	32
5	B		camera 2	This is a camera which shoots	37
6	C		wall (white) (pan to D)	This	40
	D		camera 1	is a camera which shoots	45
7	A		wall (white) (pan to B)	This	47
8	B		camera 2	is a camera which shoots	53
9	D		camera 1	This is a camera which shoots	58

right pan

Chart 2. This is a camera 2

shoots” (No.3B). Following this are the empty space (No.4C), pan to Camera 1 (No.4D), Camera 2 (No.5B), empty space (No.6C), pan to Camera 1 (No.6D), empty space (No.7A), all with corresponding narration. This concludes the first cycle. Up to this point, there have been 10 pictures, 7 shots and 3 pannings, altogether.

So far there have been three types of connections between the images: from one camera to the other (No.1B - 2D); from the second camera to empty space (No.2D- 3A); and from the empty space back to the first camera (No.3A - 3B). In the first case, the object “this” is spoken (directed) toward the other camera; however, the second object “this” is spoken toward the empty space. The first object “this” then simultaneously turns into the subject of the next sentence, but the second must wait until the third picture of a camera appears through the panning process. When this third image appears, “is a camera which shoots” is spoken starting from the predicate “is,” therefore, corresponding to the second object, one hears “this,” yet it appears to be like a sentence without a subject. This is necessitated by the time interval during the pan from the empty space to the picture of the third camera. In fact the picture (No.3B) is defined by the sentence without the subject (in Japanese “satueisuru kamera dearu” or “shooting camera is”). Here, as often occurs in Japanese, a sentence is able to communicate without a subject. I believe this sentence (“is a camera which shoots this”) is readily understandable in English as well as Japanese. Since the sentence provides an adequate definition of the picture, this suggests something interesting concerning the relationship between the image and language.

Before entering into a general discussion, I want to examine this relationship from the viewpoint of the image. Camera 1 is the object of Camera 2. Then Camera 1 becomes the subject and shoots Camera 2 as its object. This is how the two cameras are set up. The object becomes the subject and vice versa through the workings of the word “this.” This is how feedback is structured in video; the cyclic sentence is its verbal equivalent. Now the empty space between the pictures of the two cameras cannot become the subject of a camera (an empty space can not shoot). As a consequence of the logic concerning the picture, therefore, an empty space as the object can not turn into the subject. Applying such logic to verbal concerns, the object “this” applied to the empty space would turn into the subject. But in relation to the picture there follows a discrepancy between the language and the picture. The picture does not necessarily follow the logic of language. Accordingly, it would be correct to regard the sentence spoken simultaneously with the picture (No.3B), which follows the empty space, as an “object sentence,” a sentence without a subject.

If a picture can be equivalent to an “object sentence,” this posits a new theory concerning the relationship between language and the image. Two prominent theories are the montage theory of Sergei Eisenstein and the film semiology of Christian Metz. My concern here is with a picture (shot) equivalent to language. Eisenstein regarded a picture (shot) as a word, and a montage made out of pictures (shots) as a sentence. [4] This comes from his analysis of the Japanese character in which an ideogram consists of different characters (*hieroglyphs*). [5] On the other hand, Metz considers a picture (shot) as a “sentence.” [6] Metz’s idea is based on traditional French film theory in which a shot has more weight than a montage. (The word “picture” should be regarded as “shot” in reference to Eisenstein and Metz.)

What I am suggesting with the “object sentence” is that the subject is not necessarily required for the definition of a picture. Even without the subject, the sentence still provides an equivalent for the picture. This point of view differs from both Eisenstein’s theory concerning the “word” and Metz’s “sentence” theory. It is a third theory, in between the other two. In my work I have attempted to fully prove that the “object sentence” provides an alternative. Although this idea was derived from the form of a sentence without the subject which exists in the Japanese language,[7] I have shown that it can be applied to English. This may be a specialized case, yet is it not possible to generalize it? After all, a picture taken as a shot has no subject, but exists like an object with a predicate, an “object sentence.”

(Revised and translated by the author with the assistance of Bill Thompson from his book *Eizo Jikken no Tameni ((For Visual Experimentation))*, Seido-sya, Tokyo, Japan, 1987, pp.243-262.)

Since I first wrote the above paper “A Semiology of Video” [8] in

Japanese, 1983, 15 years have passed. During this period video semiology has neither been discussed as much as film semiology nor has it developed distinctively as a study. What is the meaning of this absence of video semiology in comparison to film? I do not think that film semiology in its present state can be considered adequate for video, and I do think that a study of semiology unique to video should be established. I hope "A Semiology of Video" can serve as a basis for further discussion.

This year (1998) I have had an opportunity to remake the videotapes which I consider the foundation works for "A Semiology of Video": *Camera, Monitor, Frame* (1976), *Observer / Observed* (1975), and *Observer / Observed / Observer* (1976).[9] Without altering their basic concept, I remade them more simply than the originals, reducing their length drastically (three tapes altogether 22min. from 59min.) and cutting the redundant repeating parts of the original.

The discussion hereafter is based on this remade version, but the writing previously published (on "This is a camera 1" and "This is a camera 2") remains unchanged, since those pieces were remade without fundamentally altering their concept. For instance, in the case of "This is a camera 1," nothing in the script has changed, only the timing has been shortened from 3minutes 30seconds in the first version to 2minutes 45seconds in the revised one; and "This is a camera 2" has been reduced from 3minutes 30seconds to 2minutes by giving up the repetition.

This is a monitor 1

On the work "This is a monitor," I recently wrote the following:

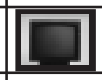
> After the already mentioned "This is a camera," there comes "This is a monitor." (The work *Camera, Monitor, Frame* includes the five small pieces "This is a camera 1," "This is a camera 2," "This is a monitor 1," "This is a monitor 2," and "To See the Frame"). "This is a monitor 1" shows the various states of the monitor.
>
> First we see a monitor (a product) without any image (No.1A); next, by switching on the monitor, which is connected to the camera, the monitor is made to show reduplicated feedback monitors in the form of a tunnel (No.1B). Then the camera goes off, and on the monitor appears no image but the scan lines (No.2C). Throughout these mages, a voice utters only "This is a monitor," repeated over and over. For this (and every other) piece there is a chart of picture plan and program, the former provides picture, description and cable connections and the latter, picture, description, voice, and minutes and seconds. What essentially constitutes this piece is the state of the image (and its absence) on the monitor. The first monitor, as an object, shows clearly the existence of another monitor within the monitor; but after we see the feedback monitor, the voice saying "This is a monitor" indicates that the actual monitor which the audience is watching is also a part of the work. In this case the actual monitor is not only to present a work on screen, but also becomes a work itself.
> Therefore this piece could not be achieved as a work in the form of a book, which is a printed medium.[10]

The above quotation is long but I think it fully explains the work. So called "reality" and "fiction" for a monitor are related, in that one can come and go between them according to the image itself as it is shown on that same monitor. A hand which invades the space for switching on the monitor act as a catalyst.

Camera, Monitor, Frame

This is a monitor 1 — **b/w, sound, 1'15"**

picture plan

	A	B	C
picture			
description	monitor off within monitor	monitor in feedback	camera off picture noise
cable connections	C-VTR	C-VTR-M	M-VTR

program — title 5" total 1'15"

No		picture	description	voice (dubbed)	min.sec
1	A		monitor off within monitor	This is a monitor	10
	B		hand in frame switches on monitor monitor in feedback	This is a monitor	20
2	C		camera off picture noise	This is a monitor	39
3	B		camera on monitor in feedback	This is a monitor	49
	A		hand in frame switches off monitor	This is a monitor	1.00
4	C		camera off picture noise	This is a monitor	1.10

Chart 3. This is a monitor 1

The sentence, "This is a monitor," is a definition and a statement. In English it has an article "a" which indicates the singular (there is no article in Japanese), but the monitor displays not only multiple states of a monitor (though they are derived from a single one) but also, in the feedback state, one sees numerous monitors in the form of tunnel. These images are plural; however, since they are mirror images of the same monitor, one may nevertheless regard them as a singular one.

This is a monitor 2

This piece is also trying to formulate a definition of the monitor, not through use of a voice but through reading (silent) letters. Unlike the voice, reading is a self-conscious act of the audience and is a more active perceptual activity than receiving the voice message, which "is heard" automatically. "This is a monitor" as a sentence is self referential as long as it is seen on a monitor, where the act of reading a sentence on a piece of paper pinned on the wall (No.1C) is transferred to looking at the monitor. That one would undoubtedly become aware that the sentence one is reading on paper is in fact on a monitor, is due to the subsequent image of a monitor within the real monitor (No.1D), a feedback image in which multiple monitors are seen in a configuration like a tunnel (No.2B). Here also the word "monitor" comes and goes between reality and image, but since the word itself is also an image, the relation of words and image, which is different from the case of words and voice, becomes even closer. In fact if one considers words on paper as "real," then when those words are transferred onto a monitor within a real monitor, one can not distinguish the "reality" of the words from the image of the words. The "reality"

Camera, Monitor, Frame

This is a monitor 2 — b/w, silent, 1'17"

picture plan

	A	B	C	D
picture				
description	title on paper "This is a monitor"	monitor in feedback	title on paper "This is a monitor"	title within monitor
cable connections	C.1-VTR	C.1-VTR 1-M	C.2-VTR 2	C.2-VTR 2 (C.1-M)

program — title 5" total 1'17"

No		picture @	description @ @	min.sec @
1	C		title on paper (pan to D)	10
	D		title within monitor	21
2	A		title on paper (pan to B)	27
	B		monitor in feedback	35
3	D		title within monitor (pan to C)	42
	C		title on paper (pan to B)	58
4	B		monitor in feedback	1.12

right pan
left pan

Chart 4. This is a monitor 2

of letters as they are seen pinned on the wall is also an image, as long as one sees them on the monitor. To be accurate, therefore, one should say "This is an image of a monitor," but in that case one would exclude the monitor which the audience is actually watching. In this video the spoken word "monitor" is referring to both the image as well as to reality. The words and the image seem to form a tautology, but they verify that the sentence: "This is a monitor" could have plural images.

If I apply this relationship of words and image to the signifier and signified of Linguistics, I could say that in the case of the sentence, "This is a monitor," the signifier has plural images of the signified, and the signification is polysemic. This can be also said of the relation of the voice (signifier) and the image (signified) of "This is a camera 1."

The big difference between this piece (#2) and the first piece (#1) is not only the difference in the delivery of the text by voice or by letters, but also the editing, in that #1 is edited by cutting, and more than half of #2 by panning the camera. Using two cameras, one camera pans from the letters on paper to the monitor in which the letters are seen (No.1D); the other camera pans similarly from the letters on paper to the image of feedback on the monitor (No.2B). Further, both use backward panning as well (No.3D). Panning shows two objects, words and image, in same time axis, and effects a relationship which is the equivalent of "and" or "then" in words. Panning is unlike the disjunction which occurs in the case of cutting. In particular, the panning from the words to the monitor in which the words are seen shows this relationship literally and as a self-verifying image.

On the other hand, the pan from the words to the feedback image seems to be a jump. However, in the system of video, feedback is simply the image of self-referentiality which is formed by a closed circuit camera with the monitor. When the camera and the monitor are in the same circuit, the monitor displays images of feedback. The first panning, to the words on the monitor, involves two cameras. One shoots the words, the other the monitor, so that the words on the monitor have been shot by a second camera, not but the same camera as in the case of the feedback. Though it jumps visually from the words to the feedback image, the signifier "This is a monitor" delivers a signified which is unique to video.

To See The Frame

"To See the Frame," the last piece in *Camera, Monitor, Frame,* deals with the issue of "frame" which is common to both camera and monitor.

The piece begins with big letters: "TO SEE THE FRAME (No.1A);" then a bright white frame appears inside of the monitor frame (No.2B). After the big letters appear again a black silhouette of the monitor is shown in outline (No.4C), and then the letters again, this time inside a monitor's frame (No.5D). Next frames in the form of a tunnel are generated by feedback (No.6E), followed by a monitor frame with letters (No.7D), and at the end there is a picture with only noise (No.8F), so that in every case the frame, which is referred to by the words, is different.

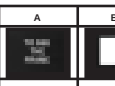
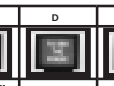
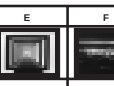
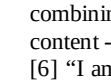
Unlike the case of "Seeing" in "Observer / Observed #2," "To See the Frame" designates the object precisely. By using the infinitive ("To see"), the words specify the act of "seeing;" in this case the infinitive points out the objective. By contrast, the gerund (Seeing) indicates a certain *state*. In "To See the Frame" the monitor frame, which is restricted by the definite article "the," falls within the general category of frame, but this category does not discriminate the real one which the audience is watching from a frame as an image; nor does it discriminate the image as the outline of the CRT(Cathode Ray Tube) from the outline of the monitor as a box through which the frame image of a tunnel formed by feedback. In spite of the definiteness of the article "the," this article supports the indefiniteness of the image. The indefinite article "a," in this case, would not adequately specify the frame; hence the definite article was used to fix the object of "to see." In the case of "This is a monitor," the monitor must be regarded as a total object, whereas "frame" has a generality of signification (as a common noun) but at the same time denotes a specific part of the monitor. The frame as a general attribute can be referenced by any of the various frames included in the image. Any one individual frame matters, yet there is always a most exterior outline which is common to them all. The frame is a boundary against the inside and at the same time against the outside. The frame in general functions as a container of the image and comprises its own image by itself as well. In the instruction "to see the frame," "frame" indicates not only the external outline but also the frame as an image boundary against the inside.

I would like to think about not only the frame of the monitor but also the frame of the video signal, which scans at 30 frames per second. This frame is usually invisible, but it can be made visible if one runs the videotape backward or fast-forward artificially, even though one can not handle videotape by hand like film. In

Camera, Monitor, Frame

To See the Frame — **b/w, silent, 1'25"**

picture plan

	A	B	C	D	E	F
picture						
description	title on black B.G	monitor on within monitor	monitor off within monitor	title within monitor	monitor in feedback	camera off picture noise
cable connections	C.1-VTR	C.1-M C2-VTR	C.1-M C2-VTR	C.1-M C2-VTR	C.2-VTR-M	M-VTR

program — title 5" total 1'25"

No		picture	description	min.sec
1	A		title on black B.G: "TO SEE THE FRAME"	10
2	B		monitor on within monitor	20
3	A		title on black B.G: "TO SEE THE FRAME"	30
4	C		monitor off within monitor	40
5	D		title within monitor: "TO SEE THE FRAME"	50
6	E		monitor in feedback	1.00
7	D		title within monitor: "TO SEE THE FRAME"	1.10
8	F		camera off picture noise	1.20

Chart 5. To See the Frame

film I have a piece called "To See the Frame, Not To See the Frame"[11], in which deal with the frame in its double meaning of the frame of film and the screen onto which the film is projected.

Actually the frame of the video signal scans 60 frames per second because of the interlaced scanning of odd and even raster line numbers, alternately, at 30 FPS. So the frame functions with respect not only to the concept of space but also with respect to the concept of time as well. Therefore "To See the Frame" should also be regarded as making visible the manipulation of time. In this piece the picture noise (No.8F) which appears at the end implies, by its scan lines, the passing of time at certain intervals.

Notes:

[1] This is added and completed version to a paper first published in English under the same title in "Takahiko Iimura: Film and Video," Anthology Film Archives, New York, 1990, pp. 44-50. See my remarks, just before (after a line) "This is a monitor 1", connecting the first and current versions.

[2] As stated in note [1], the present paper is a complete version dealing with all the works.

[3] Dziga Vertov wrote in one of his *Kino-Eye* manifestos (1923), "I am kino-eye, I am a mechanical eye. I, a machine, show you the world as only I can see it." On the same page he also wrote, " Now *I, a camera,* flying myself along their resultant..." *Kino-Eye: The Writing of Dziga Vertov*, translated by Keven O' Brien, University of California Press, Berkeley, CA, 1984, p.17. Emphasis (Italics) is mine.

[4] "*It is interesting to watch such a process moving also through the history of language in relation to the word* (the 'shot') and the sentence (the 'montage phrase'), and to see just such a primitive stage of 'word-sentences' later 'foliating' into the sentence, made up of separately independent words." Sergei Eisenstein, *Film Form and Film Sense*, edited and translated by Jay Leyda, The World Publishing Company, Cleveland, OH, 1957, pp.236-237. Emphasis is mine.

[5] After several examples of the ideogram, Eisenstein wrote, "But this is montage! Yes. It is exactly what we do in the cinema, combining shots that are depictive, single in meaning, neutral in content - into intellectual contexts and series." *Ibid*., pp.30.

[6] "I am not suggesting that each shot equals a single sentence. That is why I have placed the word 'sentence' between quotation marks through this passage. The 'correspondence' between shot and sentence is on a global scale and is derived from the fact that a shot is an actualized unit, a unit of discourse, and is inherently dissimilar to the word. The filmic shot is of the magnitude of the sentence, so to speak." Christian Metz, *Film Language, A Semiotic of the Cinema*, translated by Michael Taylor, Oxford University Press, New York City, NY, 1974, p.86. Emphasis is mine.

[7] Refer to Takahiko Iimura, "The Visuality in the Structure of the Japanese Language," *Art & Cinema*, New York City, NY, Dec., 1978, pp.16-22. Reprinted in *Takahiko Iimura, Film and Video*, Anthology Film Archives, New York, 1990, pp.40-43, both in English.

[8] *Eizogaku (ICONICS)*, The Japan Society of Image Arts and Sciences, Tokyo, 1983, Vol.2-7, No.27, pp.34-45. Also reprinted in Takahiko Iimura, *Eizo Jikken no Tameni (For Visual Experimentation)*, Seido-Sha, Tokyo,1986, pp.243-262, and Takahiko Iimura, CD-ROM, *Eizo Jikken no Tameni (For Visual Experimentation*), Euphonic Co., Tokyo,1998. The English translation by the author in *Takahiko Iimura, Film and Video*, Anthology Film Archives, New York, 1990 pp. 44-50. The German translation by Michael Glasmeire in *Takahiko Iimura, Film und Video*, DAAD Galerie, Berlin, 1992, pp.44-50.

[9] This was co-produced with the Banff Centre for the Arts, Banff, Canada in 1998 during an artist residency, and is planned for publication in a CD-ROM version, including CG and text, in conjunction with Euphonic Co., Tokyo in English and Japanese.

[10] Takahiko Iimura, "Electronic Publishing and Multimedia Art," *Kiyou*, (the university magazine), Nagoya University of Arts and Design, Nagoya, 1998, No.4, pp.25-34, in Japanese.

[11] Takahiko Iimura, film, a piece in "Models, Reel 2," 1972.

Observer / Observed (1975-1998)

Observer / Observed and *Observer / Observed / Observer* are works which capture the viewpoint of a mediator situated in the same video set up as in *Camera, Monitor, Frame*, and which deal with the issues that were discussed in relation to that work.

Though *Observer / Observed* was produced earlier, as I stated before, than *Camera, Monitor, Frame* (1976), it is presented after *Camera, Monitor, Frame*, together with *Observer / Observed / Observer*, with which it comprises a pair.

The *mediator* I am referring to is an integral part of the set up, and not only defines the image relationship as seen from his / her viewpoint but also is often a camera operator as well. Since no complete sentence is uttered (except #3), his / her speech neither specify a sentence object, nor indicates a sentence subject clearly, but is a statement concerning "seeing" using mainly the isolated verb or gerund.

The video set up is basically a relationship of interfaces. Facing each other, a pair comprising a camera and monitor are mediated by the mediator (*Observer / Observed* #1 and *Observer / Observed / Observer* #1). Or a monitor and a mediator are positioned to face two cameras set side by side (*Observer / Observed* #2, #3). These

facing structures effect a relationship of a “round trip” of the image through the simultaneity of video. In other words, this again is the structure of “seeing” in the relation of the observer and the observed. The relation of simultaneity between the observer and the observed is indicated in the title by “ /.”

#1 Observe / Observed

Among the overall trilogy this group, *Observer / Observed*, occupies the central role. There are three pieces under this title. First comes *Observe / Observed.*

In this piece the relationship between the observer and the observed is transferred to a pair of cameras and a monitor which face each other. A person stands beside the camera. This set up was already used in “This is a camera 1,” but in that case the person at first stands independently, separated from the camera; then, after the stages of dialectic between the words and images, at the end he says, “I am a camera,” looking through the camera.

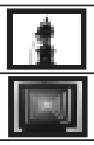
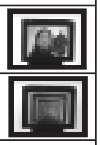
In the present piece, the person stands beside the camera from the beginning, and responds to the camera. At first we see a close up of both eyes of the person (No. 1A); she looks up and down, and a female voice (the same person’s voice) utters “observe” corresponding with the movements of the eyeballs. In the1975 version, “observe” was uttered by a male voice, but this time it is said by the person herself. The use of the male voice not only gave the viewer an order to “Observe” but inappropriately also gave an order to the person in the picture to “Observe,” through its having been spoken by the male voice .
This time, with the order being given by the person herself, this misconception can be avoided. Of course the voice can also mean an order this time as well, but it can be understood that the order is not issued by a third person toward the person in the picture, and that she herself utters the order to a third person outside of the picture.

Next a camera is seen, then the image pans down to a person with a camera shown on a monitor (No.2B). And again, it pans up to the camera, repeating the up and down movement. This up and down movement is a response to the movement of the eyeballs at the beginning. At the shot of the camera, “Observe” is uttered; at the shot of the pan-down to the person with a camera shown on a monitor, “Observed,” the past form, is uttered. This is not intended to mean the past tense, but indicates the passive voice by using the past perfect, as in “to be observed.” The relation of *Observe / Observed*, therefore, is repeated with the movement of the image panning up and down. One might wonder why the image of the person with a camera, in the monitor, is regarded as “Observed.” But if one considers that all images are subjects for “observing,” then the reason behind the word “Observed” for the image inside of the monitor is following.

Observer / Observed

#1 Observe / Observed — **b/w, sound, 2'40"**

picture plan

	A	B	C	D
picture				
description	eyes	camera & face with camera	camera & monitor in feedback	face with camera monitor in feedback
cable connections	C.2-VTR 2	C.2-M.1 C.1-VTR	C.1-VTR-M.1	C.2-M.2 C.1-VTR-M.1

program — title 5" total 2'40"

No		picture @	description @ @	voice (dubbed)	min.sec @
1	A		eyes (look up)	Observe	30
			eyes (look down) (repeated)	Observe (repeated)	
2	B		camera (pan up & down)	Observe	1.00
			face with camera within monitor (repeated)	Observed (repeated)	
3	C		camera (pan up & down)	Observe	1.30
			monitor in feedback (repeated)	Observed (repeated)	
4	D		face with camera (pan right &left)	Observed	2.00
			monitor in feedback (repeated)	Observed (repeated)	
5	A		eyes (look to right)	Observe	2.35
			eyes (look to left) (repeated)	Observe (repeated)	

⟷ pan right & left | pan up & down

Chart 6. Observer / Observed

Consider here the context of the image. At first naked eyes are seen saying “Observe;” next only a camera is seen again, saying “Observe;” and then a monitor which is shot by the camera shows a person with a camera. The camera seen as an object, therefore, is the camera which shoots (observes) the person who is seen next, and as a result, one sees the image of a monitor in which there is a person with a camera. Accordingly if one says “Observe” to the camera, one could say “Observed” to the image of a monitor which is being shot by the camera. This is because the photographer and the one who is photographed stand in the relationship of “Observe / Observed.” In other words, video is a system which is capable of visualizing as its object both photographer and photographed. (Obviously this is not a capability of film). Usually the audience watches only the object, and it is very rare to observe the photographer, as an object, at the same time.[1] Further, in this case the recording camera is not the one which is “observing” but is the one that is “Observed” on the monitor. One can notice that the “observing” camera is fixed, but the “Observed” camera is moving up and down, handled by the person. This is of course exactly the up and down panning which the audience is really watching. Therefore, it is not the normal equation of “*Observe*” = *record*, but the equation *“Observed” = record* that is formed here.

Next the picture again shows the camera, and when it pans down this time the image it turns into feedback (No.3C). Here again one hears the voice saying “Observe” and “Observed.” This is because the monitor is connected not to the “observing” camera, but rather to the “Observed” (recorded) camera, which causes the phenomenon of feedback. When the camera and the monitor are in the same circuit, the camera shoots (observes) the monitor, and the “Observed” image becomes amplified images of the monitor. In

contrast to the previous shot, which switched between images of human eyes and the camera, it is a quite interesting phenomenon that here in the present shot the “Observed” monitor is amplified by the “observing” camera.

Next the picture repeats horizontal pannings between a monitor with the image of feedback and a monitor with the image of a person holding a camera (No.4D), and the word “Observed” is heard for both. In this case the image was also recorded by the camera which is panning. Here one hears only “Observed” for both, and one notices the lack of “Observe,” but since both images are shown within a monitor, as I have already explained, one can understand the rationale for this case.

At the end we come back to the close up of both eyes as in the first image, and the eyeballs move from right to left horizontally, in response to the previous shot (No. 5A).

This work deals with the conjugation of the verb in active and passive voices. For the active voice we have the direct image of the close-up of both eyes, and for the passive voice we have the indirect image with a monitor. The monitor, especially, as a medium, provides the image which corresponds to the passive voice. It is interesting to consider whether another medium, in the case for instance of “Listen” (ear) and “Listened” (speaker), could function in the same way.[2]

#2 Seeing / Not Seeing

“Seeing / Not Seeing” is a silent piece with superimposed letters. Basically the work consists of images on a monitor which contrast the closing and opening of eyes shown in close-up and feedback image of the monitor, which replaces the eyes.

As I mentioned already at “To See the Frame,” “Seeing” is a gerund, not an infinitive. This is an important point, because the gerund, with “ing” which is similar to the progressive form of the verb, is considered here as a state or condition. Without any specific object, “Seeing” and “Not Seeing,” which are seen as images in the monitor, are themselves contrasted.

At first a hand comes in, switching on the monitor (No.1A); as soon as both eyes are seen the letters “Seeing” are superimposed (No.1B), only to disappear when the image is switched off. Then closed eyes come on with the letters “Not Seeing” superimposed (No.2C); with the opening of the eyes the message changes to “Seeing (No.2B);” and again when the image is switched off “Not Seeing” is superimposed (No.2A). In these sequences, for “Seeing” opened eyes are shown, and for “Not Seeing,” either closed eyes or no image, the empty monitor, are shown.

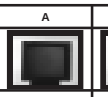
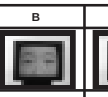
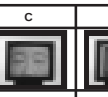
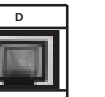
Though in two cases we are seeing “Not Seeing,” in one case it is the eyes in the monitor which are “Not Seeing” and in the second case it is we who are “not Seeing” the image. In the former case, the subject is the eyes in the image; that is, “She (the eyes) is not seeing.” In the latter case “We are not seeing the image.” Even though the words are the same, “Not Seeing,” the difference is whether the subject is in the image or is us (the audience), and whether the object is in the image or not.

Recently I showed this work and an audience member commented that it seemed to resemble the painting by Rene Magritte, “This is

Observer / Observed

#2 Seeing/Not Seeing — b/w, silent, 1'58"

picture plan

	A	B	C	D
picture				
description	monitor off within monitor	opened eyes within monitor	closed eyes within monitor	monitor in feedback
cable connections	C.2-VTR	C.1-M1 C.2-VTR 2	C.1-M1 C.2-VTR 2	C.2-VTR 2-M2

program — title 5" total 1'58"

No		picture	description	min.sec
1	A		a hand in frame. switches on monitor	10
	B		opened eyes on screen. "Seeing" superimposed	20
	B		a hand in frame. switches off monitor	30
	A		no picture on screen	35
2	A		a hand in frame. switches on monitor	40
	C		closed eyes on screen. "Not Seeing" superimposed	50
	B		closed eyes opened. "Seeing" superimposed	58
	B		a hand in frame. switches off monitor	1.11
	A		no picture on screen. "Not Seeing" superimposed	1.20
3	A		a hand in frame. switches on monitor	1.25
	D		monitor in feedback. "Seeing" superimposed	1.34
	D		a hand in frame. switches off monitor	1.42
	A		no picture on screen. "Not Seeing" superimposed	1.53

Chart 7. Seeing / Not Seeing

not a pipe.” The painting by Magritte is a denial of the picture (two pipes appear, one on a canvas painted within the painting, the other painted as though floating in the air above the other). The sentence, “This is not a pipe,” has a specific (if doubled) object. In my video no object for denial is shown, only a denial for sight: “Not Seeing.” There is even a self-contradiction in simply seeing (reading) “Not Seeing.”

In that sense this phrase is close to John Cage’s statement, “I have nothing to say and I am saying it.”[3] Further, the subject of “Not Seeing,” as I mentioned already, changes depending on the image in the monitor. If I had said in the video, “This is not a monitor,” one might have pointed out the similarity with the painting by Magritte; but what I am concerned with is the relation of the gaze between the image and the audience.

At the end, instead of the gaze of the person, “Seeing” is superimposed over an image of feedback which is caused by the camera seeing the monitor (No.3D), and then after switching off the monitor, “Not Seeing” is seen over no image (No.3A). This is the gaze of the camera eye, which has replaced the human eyes, and so the piece demonstrates that the video medium can not only substitute for human eyes but also has the capacity to produce its own image.

#3 She Sees / Seen

This piece consists of the opening / closing of eyes, the eyes shown on a monitor, and the absence of an image. The voices speak four sentences: “She sees,” “She is seen,” “She does not see,” and “She

is not seen.” These are affirmative or negative sentences, in active or passive voices, and each has the subject “She.” The narration is by a male voice to emphasize that it was spoken by a third person. Though it is not intentional, the pronunciation of “She” and “See” is confusing, and hard to distinguish in the inflection of the Japanese speaker. So there are cases which sound like “She shes” for “She sees,” and which emerge as unexpected puns on the words.[4]

Back to the work, the four spoken sentences have corresponding images attached: “She sees” = Opened eyes, “She does not see” = Closed eyes, “She is seen” = Opened and closed eyes on a monitor, and “She is not seen” = No image on the monitor and picture noise only, without a monitor.

In the active voice each word has a corresponding image, one to one, but the passive voice has plural images. Thus regardless of whether her eyes are open or not, there is the affirmative sentence “She is seen,” and regardless of whether the monitor is seen or not, there is the negative sentence, “She is not seen.”

Particularly in this piece, a question may be raised concerning the circumstance that “She is seen” is heard regardless of whether the subject’s eyes are opened or closed. But the presence of the monitor, which contains her image, makes her the object “to be seen.” This does not affirm the traditional view of woman as an object “to be seen,” in spite of the fact that the monitor imprisons the subject inside of the frame. As an image “she” claims herself to be not only one who “is seen” but also as one who “sees,” by the opening / closing of her eyes. At the same time, the image “She sees” is in fact the one which “is seen” by the audience. The constitution of the subject by the statement, “She sees,” makes the object “She is seen” work in this way as well.

The number of affirmative and negative sentences and active and passive voices is not balanced in relation to the images. For the four kinds of sentences, there are six images altogether, among which the three images each of affirmative and negative sentences are balanced; but there are two active and four passive voices, whose numbers consequently are not balanced. The passive voice has a greater variety of images.

Yet another argument to be accounted for is that an image has no negation, only affirmative properties. Even the condition of no image can be regarded as an image. In this case, “having no image” on the monitor is nevertheless a condition in which the monitor is an image, and the picture noise itself is an image. The negation exists only in words. This argument is familiar, but what I have attempted is not to determine only whether an image in general has a negative form or not. One can hypothesize an image corresponding to negative form-needless to say using words-and following the logic of words, and relying upon a conjectured relationship between images and words and this image, of the negative form corresponding to “She sees” (opened eyes), must be the image of closed eyes, wherein of course the audience can recognize the image of “She does not see.”

In general all of the images are to “be seen” (passive voice) by the audience. But if one supposes that the image can have a subject, then an image for “She sees” in the active voice can be established. Shouldn’t this work be regarded as giving the active position of a sentence subject to an image (the female) which is normally “seen” as an object, thereby also empowering the (female) image to see?

Observer / Observed

#3 She Sees/Seen — **b/w, sound, 3’15”**

picture plan

	A	B	C	D	E	F
picture						
description	opened eyes	opened eyes within monitor	closed eyes	closed eyes within monitor	monitor off within monitor	camera off picture noise
cable connections	C.1-VTR	C.1-M.1 C.2-VTR	C.1-VTR	C.1-M.1 C.2-VTR	C.1-M.1 (off) C.2-VTR	C.2 (off)-VTR

program — title 5” total 3’15”

No		picture	description	voice (dubbed)	min.sec
1	A		opened eyes	She sees	10
2	B		opened eyes within monitor	She is seen	20
3	C		closed eyes	She dose not see	30
4	D		closed eyes within monitor	She is seen	40
5	E		monitor off within monitor	She is not seen	42
6	B		opened eyes within monitor	She is seen	50
	D		closed eyes within monitor	She is seen	1.00
7	A		opened eyes	She sees	1.12
	C		closed eyes	She does not see	1.26
8	F		camera off picture noise	She is not seen	1.30
9	B		opened eyes within monitor	She is seen	1.40
10	A		opened eyes	She sees	1.51
	C		closed eyes	She dose not see	2.00
11	D		closed eyes within monitor	She is seen	2.11
12	E		monitor off within monitor	She is not seen	2.20
13	D		closed eyes within monitor	She is seen	2.30
14	C		closed eyes	She dose not see	2.40
	A		opened eyes	She sees	2.50
15	B		opened eyes within monitor	She is seen	3.00
16	F		camera off picture noise	She is not seen	3.10

Chart 8. She Sees / Seen

Notes:

[1] *The Man With a Movie Camera* (1926) by Dziga Vertov is a pioneering example. In this film, not only does “The Man With a Movie Camera” appear, but also, through the double exposure of camera lens and human eye, the film metaphorically captures the camera as an object.

[2] If one were to use a microphone and a speaker as the media for a work, “Listen,” there would remain a shortfall in its expression by the visual medium of video. “Listen” is not as perceptually selective as “See,” and the difference between “to listen” and “to be heard” is not so clear as that between “to see” and “to be seen.” Sound has the property that it is “to be heard” indiscriminately. The ear does not have the directionality of the eyeball, and the difference between hearing (the first information type) and reproduced sound (the second information type) is not so great as the difference between viewing (the first information type) and image (the second information type).

[3] John Cage *I have nothing to say and I am saying it*, video tape published in series of American Masters, The Music Project for Television, Inc. and American masters, 1990.
[4] Professor Peter D'Agostino of Temple University remarked that "This is a feminist piece."

Observer / Observed / Observer (1976-1998)

This work is an extension of the previous tape, Observer / Observed. In Observer / Observed / Observer the issues which were dealt with previously are further structured through observing of the observer of the observed; and the observed, this time, is also observing the observer realizing the "round trip" structure of the video image. In other words, the one who sees observes the one who is seen at the same time as the one who is seen observes the one who sees, thereby switching over the viewpoint. Philosophically speaking, the position of subject and object circulate freely and as interchangeable entities with each other. This economy of the image is a mechanism unique to video, one which film doesn't have, and it means that video operates as a system.

What makes this possible is the operation of double feedback, in which two sets of cameras and monitors are facing each other. In piece #1 a person is mediated between the camera and the monitor, and in pieces #2 and #3, which consist of only the camera and the monitor without the person, the image pans repeatedly between two cameras facing each other. In this work three media, image, letters, and voice, deal respectively with exactly the same phenomena. However, the voice, which is uttered, defines the structure most completely; next are the letters, which are abbreviations; and last is the image, which "represents." The three media simultaneously supplement each other and make the complicated structure perceptible. In the letter abbreviations, "C" means "camera," "M" means "monitor," and "." between two letters indicates the shooting by the former of the latter. " / " between two letters indicates the relation of shooting and being shot, in which the former is shot by the latter. The spoken parts are either simple sentences or complex sentences in which more than two simple sentences are conjoined by relative pronouns; the simple sentences correspond to the image shot directly, and the complex sentences to the feedback image, which includes both shooting and being shot.

#1 I See You / Myself

This piece comprises four pictures: two faces (male and female) each next to a camera are seen directly; another two faces (the same ones) are each seen on a monitor within another monitor (which was shot by the camera), facing each other. These pictures are shot by two cameras which face one another, with the male and female faces placed next to each camera. Two monitors are also there, facing one another, and each person repeatedly pans between the opposite person and the opposite monitor. The voice utters two sentences; "I see you who is shooting me" and "I see myself who is shooting you." The former sentence accompanies the directly-shot and the latter accompanied the image on a monitor within another monitor, shot by the other camera. The sentences establish "I" as the subject and make clear that there are the "I" who is normally not known (the "I" of the camera's point of view). The "I" who has "you" or "myself" as its object of seeing and which also has "me" or "you" as its object of shooting, therefore, "I" has two objects which make up the complex sentence.

The first picture is the direct shot of a man with a camera, accompanied by the sentence (spoken by a woman), "I see you who is shooting me (No.1A). "In this case, "I" is a woman who is outside of the picture, and is the object of the shooting; and "you" is the man who is inside the picture. At the bottom of the picture, the pronouns which are uttered, "I-You-Me," are superimposed. These pronouns are in the order which they are uttered in English; in Japanese, by the way, the order of the words "I - You - Me" is different from that in English. At this moment who the "I" is, who is apparently the object of the shooting, and who will appear in the next picture, is not clear. The "I" as a voice is invisible, and the "I" as a letter is abstract, so that in this situation "I" as a substitute for the audience is also conceivable. Next, through a pan, a woman with a camera is seen on the monitor and the voice, which is synchronized with the picture, says, "I see myself who is shooting you (No.1B)." The superimposed letters are "I - Myself - You;" since the pan limits the shot to objects which are physically adjacent within the same space, "you" can only mean the one who is located opposite, on the other side.

Since the picture is synchronized with the sound, the viewer knows that the camera in the monitor image is actually the one which is being shot / recorded, and what we see on the monitor inside the monitor, shot by the other camera, is what can be called a "reflexive" image, in the same sense that the word "myself" is a reflexive term. The third picture is of a woman with a camera and is narrated by a man this time: "I see you who is shooting me (No.2C)." This is the opposite of the first picture; here the subject "I" is a man who is outside of the picture. The superimposed letters are same, "I - You - Me." There is a pan to the fourth picture, which is of a man with a camera who says, "I see myself who is shooting you (No.2D)." The superimposed letters are "I - Myself- You." The picture and the sound are synchronized.

So far I have explained four kinds of pictures. From this point forward the four pictures repeat, but this time the direction of the pan is reversed, now going from the picture in the monitor to the image which is shot directly. This means that the piece now moves from the reflexive image to the direct image, and presents the relationship of the two in the passage back and forth between them (No.3B, 3A, No. 4D, 4C).

This piece realizes a structure of simultaneity in which the two persons influence each other through the images and texts; that is, through their functions as the observer and the observed, and as the photographer and the photographed. These four standpoints of the two persons overlap each other, so that in practice two standpoints, the observer / the photographed and the observed / the photographer, are articulated through the two kinds of sentence and are identified by the sources of the sound, which is delivered accordingly either inside or outside of the picture.

Observer / Observed / Observer

#1 I See You/Myself — b/w, sound, 1'57"

picture plan

	A	B	C	D
picture				
description	male with camera "I-You-Me" superimposed	female with camera within monitor "I-Myself-You" superimposed	female with camera "I-You-Me" superimposed	male with camera within monitor "I-Myself-You" superimposed
cable connections	C.1-M.1 C.2-M.2-VTR 2	C.1-M.1 C.2-M.2-VTR 2	C.1-M.1-VTR 1 C.2-M.2	C.1-M.1-VTR 1 C.2-M.2

program — title 5" total 1'57"

No		picture @	description @ @	voice (sync)	min.sec
1	A		male with camera "I-You-Me" superimposed (pan to B)	I see you who is shooting me	13
	B		female with camera within monitor "I-Myself-You" superimposed	I see myself who is shooting you	27
2	C		female with camera "I-You-Me" superimposed (pan to D)	I see you who is shooting me	43
	E		male with camera in monitor "I-Myself-You" superimposed	I see myself who is shooting you	57
3	B		female with camera within monitor "I-Myself-You" superimposed (pan to A)	I see myself who is shooting you	1.11
	A		male with camera "I-You-Me" superimposed	I see you who is shooting me	1.25
4	D		male with camera within monitor "I-Myself-You" superimposed (pan to C)	I see myself who is shooting you	1.39
	C		female with camera "I-You-Me" superimposed	I see you who is shooting me	1.52

left pan — male voice — female voice

right pan

Chart 9. I See You/Myself

#2 Camera1/2 - Monitor1/2

This piece was produced with the same video set up as # 1, with two facing pairs of cameras and monitors, and realized the interrelational structure of the cameras and monitors but without the two mediators. Though the basic structure is the same as #1, the description (the spoken text and the superimposed abbreviation letters) is different. Here the description involves the relation of "camera 1 and 2" and "monitor 1 and 2" instead of the pronouns "I" and "you." By repeating the pan, the peculiar condition of "double feedback" is created. When one person's camera pans between the other person's camera and their monitor, then (depending on whether the other person's camera is shooting one's own camera or the adjacent monitor) the image will be either one's own camera in the monitor within the monitor, or a feedback image of the monitor.

At first camera 2 shoots camera 1 directly and the voice states, "Camera 2 shoots camera 1(No.1A)." The superimposed letters are "C.2 - C.1." After the pan, when camera 1 shoots camera 2, camera 2 shoots monitor 1 which was shot by camera 1. In monitor 1, we see camera 2, while camera 2 shoots its own image (No.1B). The voiceover is "Camera 2 shoots monitor 1 which is shot by camera 1 which shoots camera 2." The superimposed letters are "C.2 - M.1 / C.1-C.2." Next camera 2 again shoots camera 1 directly, but the shot is cut off. Then, when camera 1 shoots camera 2, camera 2 shoots monitor 1, which was shot by camera 1. The voiceover is "Camera 2 shoots monitor 1 which is shot by camera 1 which shoots monitor 2 (No.1B)." The superimposed letters are "C.2 - M.1 / C.1 - M.2." In the image of the monitor, the numbers 1 and 2 are seen alternating within the form of a tunnel (double feed-

Observer / Observed / Observer

#2 Camera 1/2-Monitor 1/2 — b/w, sound, 1'53"

picture plan

	A (A')	B	B '	C(C')	D	D'
picture						
description	camera 1	camera 2 within monitor 1	monitor 1 & 2 in feedback	camera 2	camera 2 within monitor 1	monitor 1 & 2 in feedback
cable connections	C.2-VTR 2	C.2-VTR 2 C.1-M.1	C.2-M.2-VTR 2 C.1-M.1	C.1-VTR	C.1-VTR 1 C.2-M.2	C.1-M.1-VTR 1 C.2-M.2

program — title 5" total 1'53"

No		picture @	description	voice (dubbed) @	min.sec @
1	A		camera 1 "C.2-C.1" superimposed (pan to B)	Camera 2 shoots camera 1	15
	B		camera 2 within monitor 1 "C.2-M.1 / C.1-C.2" superimposed (pan to B')	Camera 2 shoots monitor 1 which is shot by camera 1 which shoots camera 2	32
	B'		monitor 1 & 2 in feedback "C.2-M.1 / C.1-M.2" superimposed	Camera 2 shoots monitor 1 which is shot by camera 1 which shoots monitor 2	52
2	C		camera 2 "C.1-C.2 " superimposed (pan to D)	Camera 1 shoots camera 2	1.03
	D		camera 2 within monitor 1 "C.1-M.2 / C.2-C.1" superimposed (pan to D')	Camera 1 shoots monitor 2 which is shot by camera 2 which shoots monitor 1	1.21
	D'		monitor 1 & 2 in feedback "C.1-M.2 / C.2-M.1" superimposed	Camera 1 shoots monitor 2 which is shot by camera 2 which shoots monitor 1	1.39
3	A		camera 1 "C.2-C.1 " superimposed	Camera 1 shoots camera 2	1.47

left pan

Chart 10. Camera 1/2 – Monitor 1/2

back). The spoken sentence here is not easy to understand unless one is quite attentive. Though it is possible that a listener would find it incomprehensible during one reading, the abbreviation in letters does help to make the meaning clear.

The above has described the images which were shot by camera 2; next seen are the images which were shot by camera 1. Here cameras 1 and 2, and monitors 1 and 2, are reversed from their previous roles, and in the case of the double feedback on monitor 2, the order of the numbers is 2 and then 1, as they are seen alternating within the feedback tunnel shape. This interchange of the numbers is also carried over to the voiceover and the superimposed letters.

Thus the complex relationships between shooting and the images which are effected by two cameras and two monitors have been examined, and through their carefully articulated relationship they reveal for the first time the structure of the interaction between "seeing" and video. Not only do we find a deep relationship between "seeing" and video, but, since the modalities of the "reading" of text and the "listening" to a voice are also included, one could say that here the structure of perception is also being revealed. What I have attempted is to challenge the limits of perception in these "complex relationships."

#3 Camera 2 - Camera 1 / Monitor 1/2

As in #2, here two cameras and two monitors are used; however, this time two monitors are placed beside camera 1, facing camera 2, and all the shots are taken by camera 2 only. The piece deals mainly with the movement relationships created by panning between camera 1, monitor 1, and monitor 2, rather than articulating the various structural relationships, as in #2. Therefore the voiceover here takes the form, "pan from - to - "

At first we see camera 1, which is shot by camera 2 (No.1A); then the shot pans to monitor 1, on which we make out “our own” image (our camera, camera 2), which is being shot by camera 1. The voiceover, which is spoken at the beginning of the pan, is “Camera 2 pans from camera 1 to monitor 1 which is shot by camera 1 (No. 1A . 1B).” The superimposed letters are “C.2 - C.1 . M.1 / C.1.” (where . means pan). Next the shot pans farther to monitor 2, which is being shot by camera 2. In this case not double feedback but simply only the everyday kind of feedback, between camera 2 and monitor 2, is seen. The voiceover states, “Camera 2 pans from monitor 1 to monitor 2 which is shot by camera 2 (No.1B . 1C) .” The superimposed letters are “C.2 - M.1.M.2 / C.2.” Altogether there are three different images here, along with the two pans between them: camera 1, camera 2 seen on monitor 1, and monitor 2’s feedback. Through the pans, which restrict the shot to one space, but which nevertheless move between the opposite camera, the monitor on which our own camera is seen, and the feedback image, a “round trip” between other and self is effected. The piece is not just a group of arbitrary movements of the two cameras, but is a circle-like coordinated movement in which pans by one camera are reflected in movements by the other. Visually there are only repeating pans, but these movements convey a deeper structure, in traversing from the reflexive images to the feedback images. The piece thus develops from a static structure into structured movement. The question here is whether as a viewer one is able to capture the meanings of this movement fully and in depth.

(Translated from Japanese by the author with the assistance of Tony Conrad, Professor of the State University of New York, Buffalo, New York).

Observer / Observed / Observer

#3 Camera 2-Camera 1/Monitor 1/2 — **b/w, sound, 1'33"**

picture plan

	A	B	C
picture			
description	camera 1	camera 2 within monitor 1	monitor 2 in feedback
cable connections	C.2-VTR 2	C.2-VTR 2 C.1-M.1	C.2-VTR 2-M.2

program — title 5" total 1'33"

No		picture @	description	voice (dubbed) @	min.sec @
1	A		camera 1 (pan to B) "C.2-C.1 ← M.1/C.1" superimposed	Camera 2 pans from camera 1 to monitor 1 which is shot by camera 1	6
	B		camera 2 within monitor 1 (pan to C) "C.2-M.1 ← M.2/C.2" superimposed	Camera 2 pans from monitor 1 to monitor 2 which is shot by camera 2	20
	C		monitor 2 in feedback		28
2	B		camera 2 within monitor 1 (pan to A) "C.2-M.1 ← C.1-C.2" superimposed	Camera 2 pans from monitor 1 to monitor 2 which is shot by camera 2	36
	A		camera 1 (pan to C) "C.2-C.1 ← M.2/C.2" superimposed		48
	C		monitor 2 in feedback	Camera 2 pans from camera 1 to monitor 2 which is shot by camera 2	58
3	C		monitor 2 in feedback (pan to B) "C.2-M.2 ← M.1/C.1" superimposed	Camera 2 pans from monitor 2 to monitor 1 which is shot by camera 1	1.05
	B		camera 2 within monitor 1 (pan to A) "C.2-M.1 ← C.1-C.2" superimposed		1.19
	A		camera 1	Camera 2 pans from monitor 1 to monitor 2 which is shot by camera 2	1.28

→ right pan

Chart 11. Camera 2 – Camera 1 / Monitor 1/2

The Virtual Poetry Domain

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ABSTRACT
This is a summarized review of what has been done in Argentina in these last years around the development of virtual reality three-dimensional texts, with the intention to "graduate" (in its semiotic meaning) the VR field in respect to those *intrinsic* codes that could be produced therein, and with the help of the future *Aided Creation Programs*.

General Terms
Experimentation, Languages, Theory.

Keywords
Artificial Brain, Cyberspace, Poetry, Semantic Fields, Virtual Reality.

1. INTRODUCTION
Two circumstances exist which seem to challenge the supremacy of *hypermedia* (*hypertext* + *multimedia*): on one hand, we have *three-dimensional interactive simulations* generated by professional virtual reality (VR) systems; on the other, systems endowed with *intelligent processing*. The former constitutes maybe one of the worthiest contributions made by computer science in order to determine environments that are parallel to our real physical world. It is known that computer developments change at a rapid pace, forecasting with certain clarity the inevitable destination to which they are literally rushing: the breakup of the *abstraction techniques* of the general physical properties of the represented —applied inexorably to the precarious original systems that suffered severe restrictions in compute execution. That is to say, the perfect *concrete* simulation of all those objects or processes transposed into the virtual space of the machine —honoring any intrinsic profile of each event to transpose. Also, VR not only results in benefit of a more realistic access for displays, trackers, sensors, etc., to *representations* of material entities *sustained* in the artificial environment, but rather, and fundamentally, it offers the invaluable possibility of manipulating *objects without factual equivalence*, ideal entities decidedly developed due to the existence of that support. And here is where the *poetic function* will intervene with enormity in fact for the *design* of events that respect neither natural laws, the processes that they impose, nor those solutions extremely often applied in cases of other previous supports.

The particular way of connection for which hypermedia is arranged is far from becoming at least a basic model for the development of intelligent strategies for data processing, in the order of the *semantic* information that they transport —possibly because it is not able to become a favorable model for the representation of the system of information processing in the human brain. The point here is that the production of texts[1] in the same artificiality could not be reduced in any way to a question linked exclusively to the morphological or syntactical aspects; it is not only a syntax what in the particular case of the digital poet he/she will have to produce.

Therefore, semantic concern of the contents that are driven in new media should be present. This situation, referred to the necessity of implementing intelligent systems able to administer semantic information, has already been noticed for some time by numerous researchers, institutions and even companies that have begun to elaborate diverse answers due to guide another type of resolutory dynamics that overcomes the model imposed by hypertext and, by extension, hypermedia. Here we could point to the following good examples: developments made by Dr. Paul S. Prueitt, at the George Washington University, on *computational intelligence* based on *semantic spaces* and *theme vectors*; *semio maps* introduced by Semio Corporation; the notion of *multidimensional semantic space* like a *constellation of attractors* experimented by Hinton, Plaut and Shallice; automatic techniques of conceptual and semantical evaluation and also of *aesthetic understanding* produced by the Machine Understanding group directed by Dr. Kenneth Haase in the MediaLab; and so on.

Undoubtedly, thought someone could be annoyed by this situation, we are thus positioned in an era of *transition* between our physical or factual reality and that artificiality or logical-synthetical reality that will have to be added to this physical

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Germany

[1] In the general semiotic sense —not only verbal— as «result of the coexistence of various codes or at least of various subcodes». Eco, Umberto, *A Theory of Semiotics*.

reality. This unique circumstance allows us to distinguish principally that the radical change in the nature of the support *as has never happened in the history of humanity* —the acquisition of the role of *agent*— and the events that will be generated thanks to it, make us face the challenge and the responsibility to *create* and to *permit the advent of languages that could be of its own*. This involves the process of emission, the brand-new substance of messages, the way of reception, feedback and recreation, the institution not only of codes but of new mechanisms of discernment of those codes, the design of an effective critical theory which fits the virtual environment and that will replace the old-fashioned statements of a philosophy already inoperative for it, the new estate that will gain the human intelligence and sensibility with regard to a system of creativity *shared* with the machine, and so on. This irruption furthered by the digital technologies of simulation (either for *environments* or *behaviors*) forces us to evaluate very seriously the imminent emergence of an n-dimensional virtual world, accessible through all our senses, hyperconnected, intelligent, endowed with artificial life... in brief, what is called the *global information circuit*. It also means that thinking today the future aesthetic production in terms of animations, hypertexts, videos, multimedia, etc. is to miss the target. Our animations or videos will be a little bit related to what will be generated therein; link-node hypertext and multimedia will never be the techniques that emulate the complex processing of signs performed by the human brain, but this kind of processing will be integrated completely to the system in a potential *artificial brain*, with resources like, for instance, a powerful artificial handling of semantic fields, emulation of neuronal circuits and their advanced procedures for signic administration, the possibility of understanding of the diverse functions of language by the artificial entities and the resulting sudden and automatic development of the work by their own will, among others. For this reason, we say that techniques and computing devices that we have today are in some way coarse approaches, simple advances toward that global information circuit. We are conceiving recently the bases of new languages, exploring a relatively small number of properties of only one approach to that new medium. So I believe that what we should never overlook is that all these concepts together with many others will be integrated into that future environment and is only there where they are going to stand out, now as the execution of those preferences that have been conceived through the *Virtual Poetry* proposal (VP or vpoetry) and, very especially, by its implementation in cyberspace.

2. VIRTUAL POETRY

Starting from my experimentation with diverse visual and sound works generated by computer[2] and the production of non-representative or *madí* poetry —for example, in *Estiajes*[3]—, I would begin to observe progressively the existence of problems tied, on one hand, with the concept of *information* and, on the other, with the possible structures of the cerebral organization entrusted on the recognition of a text like a poetic one. These matters dealt by the Argentinean semiologist José E. García Mayoraz appealed to me particularly[4], and they induced me to incorporate *calculus* as an integral part of the process of poetic composition (visualization of values of entropies —null memory source and Markov—, informations, efficiency and redundancy...) and to foresee it as the initial link of a chain that should culminate in a complex system of attendances to creation.

The new singularities highlighted by the manifesto of the TEVAT group[5] become as the more immediate complement of the work made in *Estiajes*. I'm referring especially to all those facts related to: (i) the identification of codes in the interface of immersion of the VR equipment, (ii) hyperstructures of language in n-dimensional spaces, (iii) vectorial analysis of the semantic fields in systems that simulate the cerebral activity, and (iv) practice of the creation in cyberspace, always trying to institute codes in that medium. These factors together with the previous ideas facilitated the development and the later presentation during 1995 of two projects of extraordinary importance for the expectations of the TEVAT group as a prospective movement. *Art Criticism in Cyberspace* [2] by García Mayoraz —we will focus on it later— and in my case, the necessity of assimilating the digital simulation technologies to a project of poetical creation in cyberspace that surpasses the use of current computing devices and that let me integrate my diverse precedent experiences, would give me the opportunity to formulate, at the beginning of the same year, a proposal that I entitled: *Criteria for a Virtual Poetry* [1] [4], given the relationship expounded at first between poetic creation and VR environments.

Virtual poetry would have to be a precise answer from the field of poetical creation to a digitalized world that already referred us in an almost permanent way to Internet, telepresence, nanotechnology, computed animation, cyberspace, etc. Hence, I recognized in its respect three primary characteristics: behind the indispensable conjunction between human creative work and the use of *electronic media* that has enormously widened *all fields of work*, providing extremely valuable tools for the development of ideas, the entire creative process must progress in the virtual space offered by the machine. Then I said also that *digital world*, which deeply differs from any physical, real or analogical realization, bases its preeminence on the *numerical* character of the elements that it admits, and on the possibility of

[2] Particularly, the *Sequence on the Madí Logo* of 1986, a performance that consisted in a recreation of a Gyula Kosice's poem using digital synthesis of voice, together with the exhibition on a monitor of three-dimensional images created by means of a photocomposition by Grete Stern.

[3] Verbal work composed with around 3,700 words, formulating *consignas* (independent tracks like *modular objects* that could be added by chance or choice).

[4] Especially after having become aware of his work *Entropía/Lenguajes*, Buenos Aires, 1989.

[5] For "Time, Space, Life, Art, Technology" in Spanish. Launched in Buenos Aires during the first semester of 1994, receiving the adhesions of the aforementioned García Mayoraz, the prominent artist, poet and theorist Gyula Kosice, and myself.

openly fixing correlations between virtual space, objects and subjects, as no other medium has yet allowed. Lastly, I adverted that the application of digital computers has not only made possible the access to a *custom-definable* virtual space or to a large series of algorithmic operations, but also it has fundamentally inaugurated an *essentially different* field, for which it is necessary to produce *new languages* which will *give birth* to a *new aesthetics*. Consequentially, virtual poetry would result after an intimate linking to these three primary qualities: virtual space, its digital nature and the conception of events private to that medium. Toward such effects, *virtual poems* or *vpoems* would be interactive digital entities capable of integrating themselves in —or rather being generated within— a *virtual world* (here called *Virtual Poetry Domain* or *VPD*) through software or routines (for the development of VR applications and real time exploration) that confer on it diverse modes of manipulation, navigation, behavior and alternative properties, evolution, sound emission, animated morphing, and so on; and being experienced by means of partially or fully immersive interface devices.

The opening of the VPDs to the telecommunications networks will facilitate the execution of *virtual teleportations* of subjects toward VP based computers (anywhere on the planet or in physical space), achieving a remote, simulated and exploratory experience of "reading". This kind of network connection from any computer to that established as the base of the system, will permit to share the domain with whoever puts on any visualization interface, wires to it and takes at least a "cyber-reading-tour". You could move about the domain by gesturing with your data-glove or with any other analog device, viewing the texts as they are rendered with the information stored in the VP computer. You could interactively specify "flyby" paths so as to "float" above the vpoems to "read" them from many angles, reaching out to "touch" them —using forcefeedback devices—, and so on. This sort of wired process by means of Internet is not available yet because of the narrow bandwidth of the net, but undoubtedly will be in the next years, since the field of VR and the Internet are rapidly expanding.

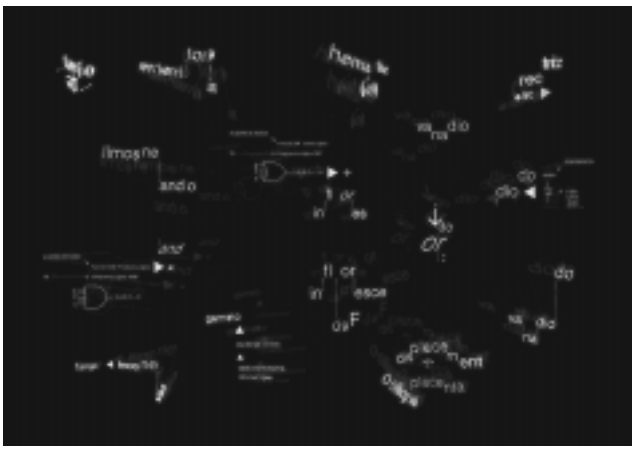

Figure 1. Some semiotical resources used in virtual poetry.

Faced with the usual graphic 2D interfaces that current hypermedia systems possess, accessible through superimposed "windows" or "pull-down menus", such access will be contemplated through "sub-spaces" within the VPD, to which it will be necessary to turn with the goal of running a set task or execution. This permits the introduction of a large series of special attributes which will support a highly innovative practice of creation and design. These attributes could be grouped under the proper domain and under the virtual objects that occupy the synthetic space that the system generates. For example, an attribute that characterizes the domain would be the availability of tools of creation and editing of entities capable of receiving instructions and/or acquiring the group of data required through gestural codes (for example, manual) and sound (through voice recognition), replacing the traditional methods by written verbal commands or even icons accessible with 2D pointing devices. In the case, now, of the attributes or operations that affect the constituent elements of the virtual work (see Figure 1), we could mention, for instance, the *linking* functions that send to or call from other text sectors related to some kind of syntactic, semantic, or other mark (known as *associative memory*, in which a *fragment* recovers the *whole*). This behavior fires off an opening of text similar to the complex typical branching of the Global Semantic Universe. On the other hand, the forces (*attractions*) pulling on a sign unit relocate it in space such that it makes manifest with its repositioning the links that act simultaneously in any of its profiles and that the usual syntactic order represses. *Multiple derivations* propitiate the text to branch off into several paths that are continued simultaneously, producing double or triple units, superimpositions, and so on. Also certain resources related to a *spatial semiotics* (folds, separations, rotations, etc.) could concur to reinforce meanings. *Chains of references* allow to discharge a sequence of signs that are linking successively each other from one of them that acts like a beginning, remitting us to almost every document that resides in cybernetic space. This wide list of functions could be continued.

Mentioning virtual poetry today already imposes a full agreement with the idea of a digital domain inside which not only the tasks of recognition or reading are carried out but mainly those of the creation or composition of works themselves. Speaking today about a virtual poetry implies a relationship with a platform of design of the poetic phenomenon that emulates the readiness of resources of our real world in its interface (as for its three-dimensional operating functions), as well as offering approaches to intelligent processing that assist and suggest the immersed subject with creative intentions, new routes, and unexplored fields, not avoiding quantifications when these are necessary. At the same time, he/she is offered methods of probabilistic evaluation of the different instances confronted, advanced semantic operations, rules or functional laws conceived "on the fly" by the user and applicable to different particles defined in the text, empirical strategies to optimize the resolution of certain difficulties in the composition, and so on. Also, since they are complex algorithmic objects and processes, or attainable by means of associated *neuromorphous* circuits[6],

[6] Electronic circuits with a highly parallel architecture designed according to current knowledge of neuro-physiologic

these virtual systems will have series of tools at the disposition of those who will visit them, able to make operations inconceivable in our natural world and/or signic treatments only comparable to those produced by the human brain. In short, all this permits the specification of very elaborated strategies of composition.

One could also conceive of the existence of supercomputers that centralize the activity of these digital domains or systems, as those we have mentioned in the present work, providing something as well as a public service of attendance to creation in which all the activities of information production are developed in an *integrated manner*, allowing for the renovation and updating of the materials it contains, seeing that the process of gestation, emission, reception, critique and feedback of messages *must take place inside it, without any transposition to external media* —which lighten the burden of the "specific weight" of that which was digitally conceived.

Clearly, that primary demand of a purely digital system of creation and all this group of characteristics which qualifies the proposed system —and which we just revised—, its particular type of interface, will permit, as a final consequence, an extremely intuitive and extensive semiotical development of *universal texts*, in which units coexist coming from numerous languages, codes and syntactical systems, conceived from the most diverse continua, that is to say, texts integrated by verbal units but also sound, visual, kinetic, spatial, tactile, smell, gustatory, thermal... ones. This happens in the *overall* processing of information in the human brain, in which a large number of network routes are activated through neuronal connections, showing evidence of the competition of *all signs*, whether from a more removed field, which for some reason or another is linked to the entity that initially enters cerebral "space". Only this has been the ultimate and more valuable goal of that first demand: the construction of a digital system that ensures that *all the signic phenomena* may participate in an *integrated* and *interconnected* structure similar to that of the human brain, with the appreciable advantage of its disposition open to the telecommunications networks. This is the way VP got planned, in this second instance, beyond hypertext and around an intelligent processing that would allow a truly *living organism* which, being open to interconnectivity, would evolve uninterruptedly toward all-embracing strata of high information.

3. ART CRITICISM IN CYBERSPACE

Art Criticism in Cyberspace by García Mayoraz, work in whose realization I was fortunate enough to participate, had been proposed in order to put into evidence that in virtual spaces all creative process, especially poetic one, could be accessed and visualized through a veracious approach to the cerebral signic phenomena that determines it. Kosice's poem *Primer Agua* (First Water) provided him the opportunity to propose this work and, at the same time, to show digitally the behavior of the *Vectorial Semantic Fields*[7]. The work illustrates the process of formation of a single sintagm belonging to the aforementioned poem. The object of making explicit such a process of formation, now under the model of the vectorial semantic fields, was to advert about the possibility to possess, already inside digital virtuality, this kind of analytic appreciation as a substantial part of the same creative process. This visualization in virtual space of the diverse stages of signic development of a work is just an *explanation* in the same terms in which that development takes place. That is to say, the same development of the work is either the process of production or its own explanation or *criticism*. «All creation in cyberspace —says García Mayoraz— involves in its own mechanism the reception of the same signs with which it is going to operate, in such way that writing [or authoring] and criticism have no other destination than to progress in an unified path, doing the same things. At the same time the artist carries out the work he/she is also showing how it is produced, in some way he/she explains it —if we could say so (...) In other words, we now discovered that in cyberspace criticism is already constituted in the own phenomenon of production of the artwork» [*Introito a la Crítica de Arte en el Ciberespacio*, personal communication], since the proposed system of aided creation in cyberspace, to which the same artist will be a constituent part, will be able to allow the visualization of the signic development of the virtual work at *the same moment* in which this is carried out, «having there a medium totally superior to those of his/her own isolated media».

For the complete digitalization of the process of formation of the chosen sintagm we agree —continues García Mayoraz— «in assigning spherical forms and arbitrary positions inside the represented brain to these semantic fields, to achieve a didactic outline that was dynamic (...) And although the true semantic-dynamic domains possess other forms, those chosen for this work allow the adoption of many intradomain conditions of interest like, for example, the *Hamming* distances [or code distances], which here appear highlighted by means of trunk-conical bites extracted from the spheres. The representations of the sememes in the form of prisms, and their semes, like hemitoroidal protuberances stuck to them, are much more arbitrary, of course; the sintagms, therefore, had to be "little trains" of prisms» [2].

The work concentrates in a single semantic nucleus (see Figure 2), the sintagm: <porque la gota es una miríada oblicua> (because the drop is an oblique myriad). Located in the semantic field *Primera Agua* (First Water), diverse sintagms of the poem are identified as carrying the *a priori entropies*, that is to say, the elements that having already been incorporated in the text generate almost something alike to a certain propensity for the determination of any posterior expression. The entrance of the diverse sememes that form the beginning of the chosen nucleus is followed almost immediately by the most probable vectorialization, the one that has produced the appearance of the sememe <mirada> (look). We can also see how the field *of the*

morphology, endowed with functions of overall computing, not sequential, characteristic of integrated neural networks.

[7] A theory expounded in his book *Entropía/Lenguajes* and presumably confirmed later by Geoffrey E. Hinton, David C. Plaut and Tim Shallice in their studies of language in the brain, published during 1993.

structures, that manages syntactic aspects, participates; we can do this through the observation of the diverse sectors in the virtual representation of the brain. But here, when all indicators would let us to foresee the formation of the sememe <mirada>, element <í> arises and seems to interfere, precipitating the process toward the chosen lexia: sememe <miríada> (myriad). If we analyze what happened in the proximities of the semantic field *Kosice-discurso del agua* (Kosice-water discourse), in which the field *Primer Agua* is certainly contained, we can individualize several more semantic fields that tried to obtain for themselves the sememe <miríada> which advanced toward the *Kosice* field. In this way <miríada> was attracted simultaneously and in a vectorial form by diverse sememes that belong to diverse fields due to the semes they share. The vectorial composition that prevailed (according to the forces and directions that the vectors that represent the "weight" of their semes show) precipitated the sememe <miríada>, defeated minor attractions of the other fields, into the field *Kosice-discurso del agua* and in particular into the semantic field *Primer Agua*, with the consequent addition of <miríada> to the proper sintagm.

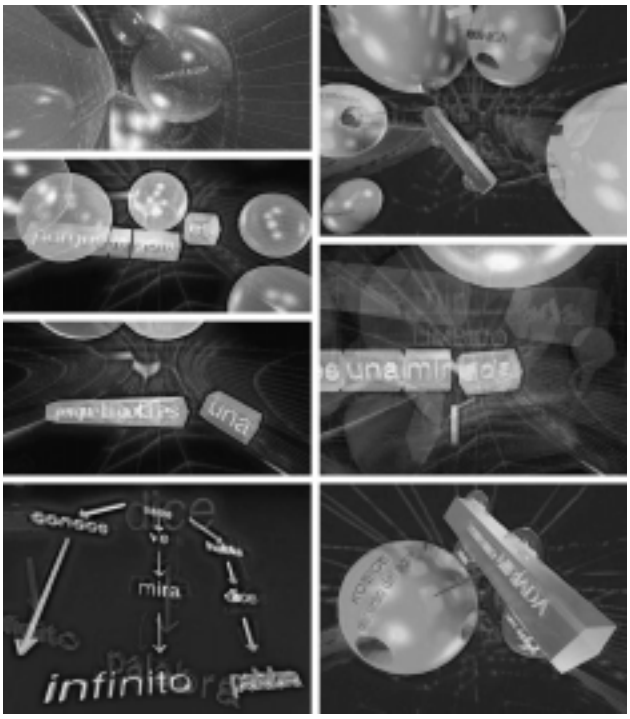

Figure 2. ***Art Criticism in Cyberspace*** **digital animation stills.**

A similar process to which we just described is developed after the approach of the sememe <oblicua> (oblique) to the sintagm formed previously, finally promoting its annexation. Following the resolution of the struggle the appearance of the *a posteriori entropies* takes place, suggesting the continuity of a process necessarily more extensive and intricate that the one expounded by the following of only one sintagm. Nevertheless, it is useful as it makes ostensible this class of analytic mechanism, which an aided creation system like the one proposed in these pages will have. Additionally, this dynamics of progression of an electronic text starting from the vectorial semantic fields and the processes of attraction that take place therein, have been incorporated as a constituent part of the same vpoetry —this is the reason why I believed it would be convenient to show them in this context.

4. EVOLUTIONS IN VIRTUAL SPACE

Illustrative material that accompanies the text should be considered as a mere demonstration or —if you prefer— a visual approach to the system, applications and works that would rise into the present proposal of a digital domain used for the poetic creation in cyberspace. These practical examples included in 3D digital animation videos, still images and VRML models (see Figures 3, 4 & 5) have been conceived fundamentally in order to illustrate how some of the functions to implement could be. They show, of course, some aspects concerning a mainly verbal formulation of language (that is to say, alphanumeric), although certain visual attributes appear subsidiarily, and in these concrete demonstrations, no sound attributes. It should be understood that this circumstance is merely transitory. In this initial or starting implementation we preferred to limit us to those basic verbal or signic functions, as the specific functions that the project could manage will be added and will evolve progressively and with no delays, since the architecture of the system allows it with no trouble.

Figure 3. VRML of the ***Vpoem 12 c*** **at** ***lpgyori.50g.com*****.**

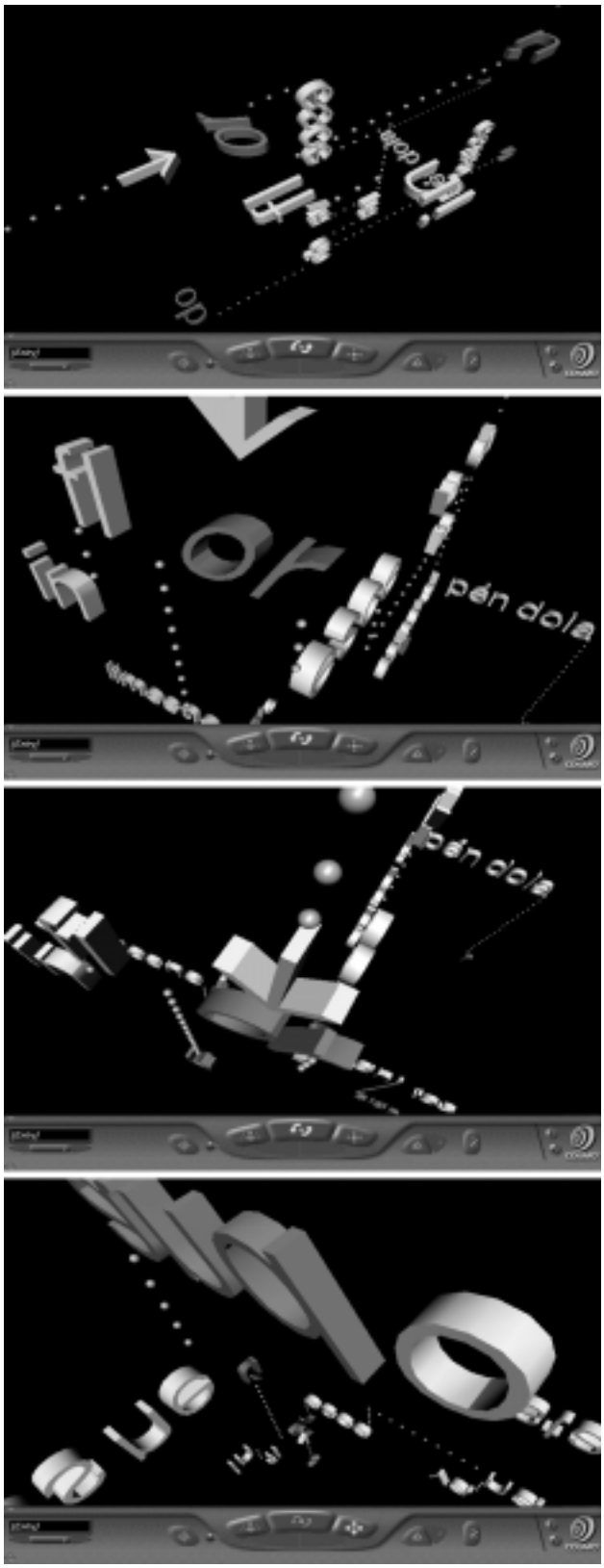

Figure 4. VRML model of the *Vpoem 13.*

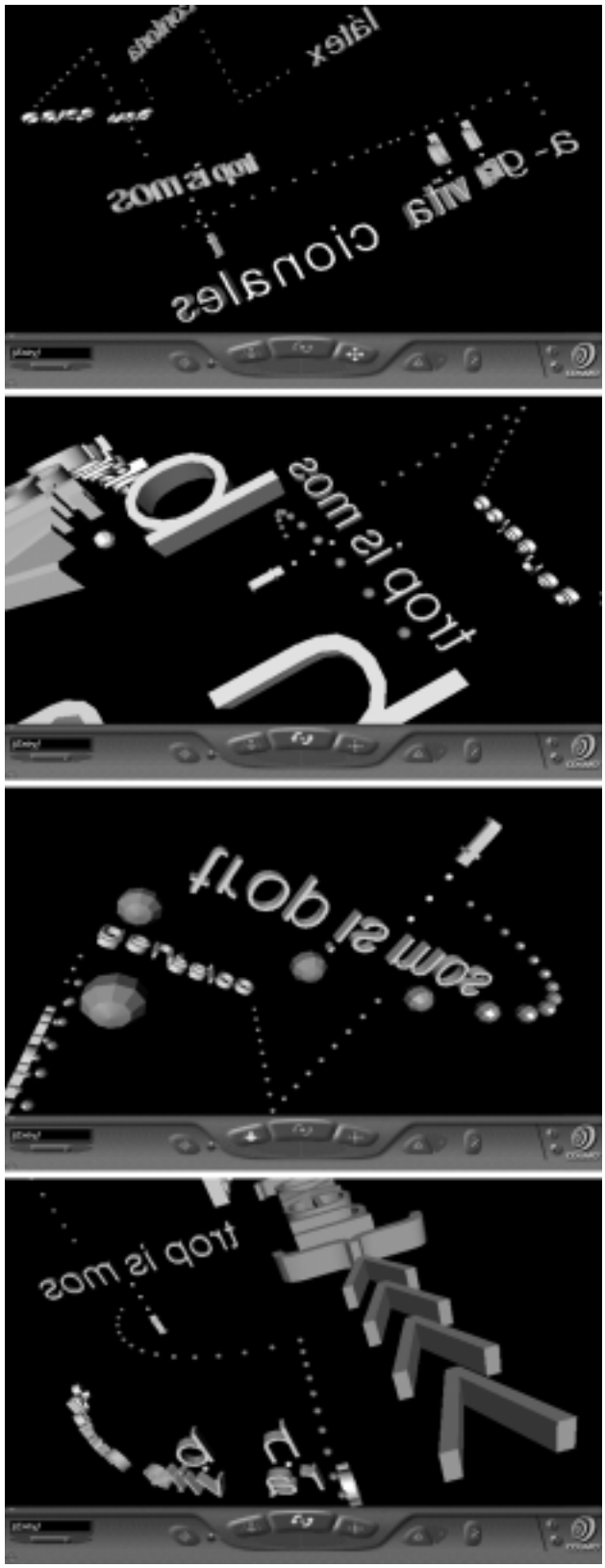

Figure 5. VRML model of the *Vpoem 12 c.*

Vpoem12 (1995) begins its evolution in virtual space by briefly introducing its components, while it reveals diverse profiles during its formulation: after the appearance of <terri.torio> particle, there is an attraction of a nearest field over <torio> (thorium), causing an opening toward some properties related to the classification of chemical elements. Then, the original root works resolving the formation toward <territori (a) lidad>, folding the <o>. The appearance of <hema-> radical considers simultaneously the particle <tíe> and the linking with <globina> by means of the use of the double vowel, producing a singular spatial disposal of the group. The <men> block, at the other hand, leaves <fulgen predicamento> attracted by the block <espéci-> which comes into the space of composition, being shared by both particles. <rectriz> acts between *a* and *b areas* like a nexus. The "recording" symbol attracts the block <rec> showing with its new location that signic connection. Also, from the original composition there is a separation into two groups: a remainder one and another which tends to order itself establishing an alternative structuring. Foldings, separations, the general variability of the composition... reinforce visually certain relations among signs, generating an arrangement which extends largely on 3D virtual space, assuring, therefore, a structural diversity, appreciable during a "flyby" (see Figure 6).

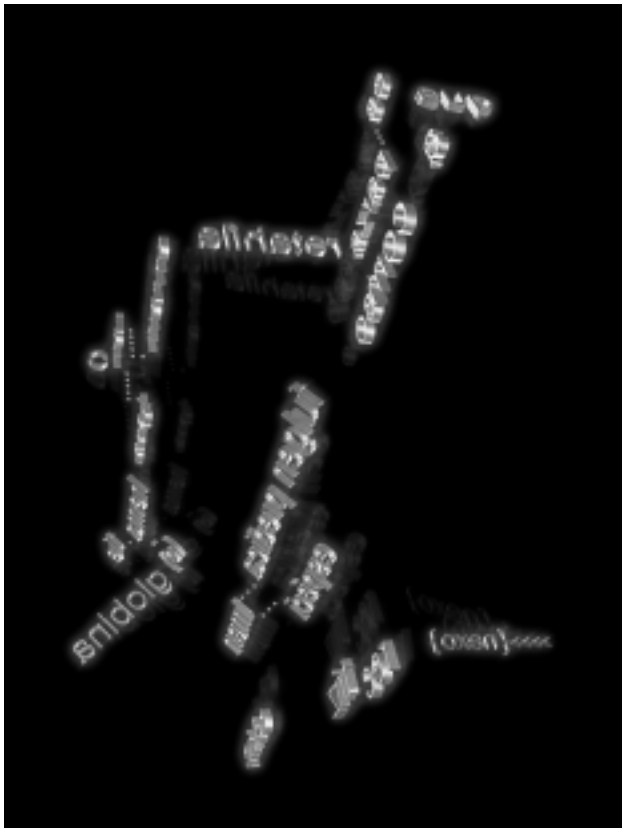

Figure 6. *Vpoem 12* - A closer "flyby" over *area-a*.

When *area-c* is reached, signs reveal a distribution connected with dots, remarking specially a certain aperture at <a-gra-vita>. By coming within a specified distance to the block <vita> a link to the *{2} section* of *Vpoem11* is triggered, due to the morphological coincidence with <vita.minoide>. By coming back to the top of the *area-a* another link occurs. It relates some elements of the periodic table —in this particular case, by their boiling points— getting to *Vpoem13* at <vanadio> (vanadium). The little module established as a base of the vpoem shoots up with a chain of references —to electronic concepts, non-linguistic elements, and so on— and connections that abruptly spread the primitive structure, generating a complex body of non-linear meanings that can be crossed and circumvented (see Figure 7).

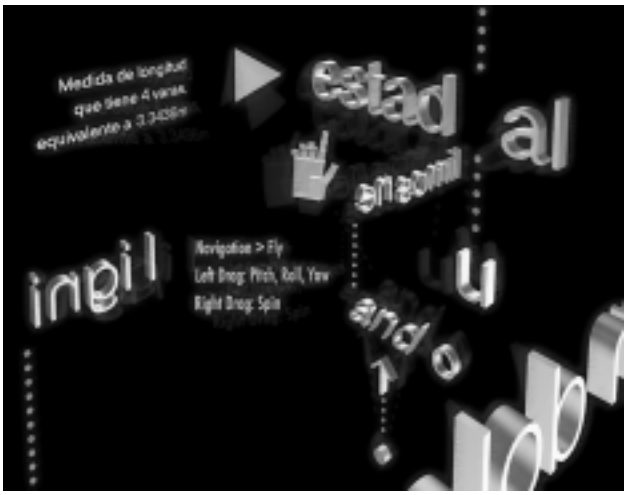

Figure 7. *Vpoem 13.*

Another animation video also shows the evolutions of *Vpoem14* [3], simulating certain characteristical behaviors of the digital domain of works. It is interesting to observe how semantic marks are detaching from the diverse terms involved and how different signic attractions intervene. They drive the composition progressively toward new *zones* of significance. And I say "zones" in total agreement with the concept of semantic non-linearity, in the sense of engendering interconnected zones of free traveling in the associative fields (see Figure 8).

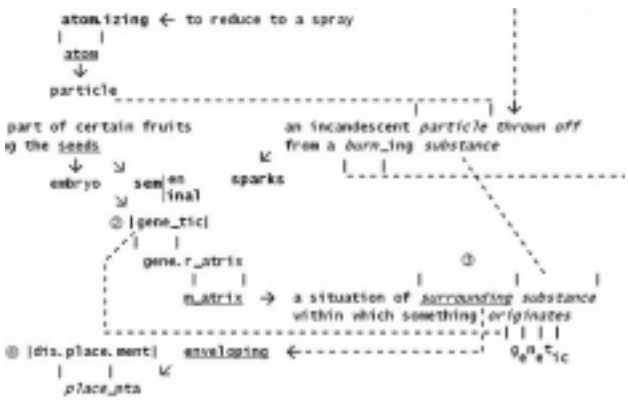

Figure 8. A section of the componential tree of *Vpoem 14*.

The notion of "place" —present in <dis*place*ment>— opens and closes practically the composition. From the beginning terms like <deformation>, <wreckage>, <disorder>, etc., appear, suggesting a tendency toward a sense of maximum disarrangement. Conversely, starting from <flowage>, that contains <deformation>, the particle <stock> arises through the block <solid body>. This particle belongs to <stockade>, that means a "progenitor of a family line", from which will come off, later on, the sememe <genetic>. And, simultaneously, that same particle will generate a second path that will drive mainly to <scoriae>, <fragments> and <pulverized>, in order to consolidate a state defined with the detachment of the particles <cor> and <e>, of the anterior <s*cor*ia*e*>, that become <core>, opening up to <seminal>. That is to say, both branches of the evolution of the vpoem head *semantically* to <matrix> in order to finish in <placenta>, what, in turn, have been promoted or attracted *morphologically* by the block <place> (see Figure 9).

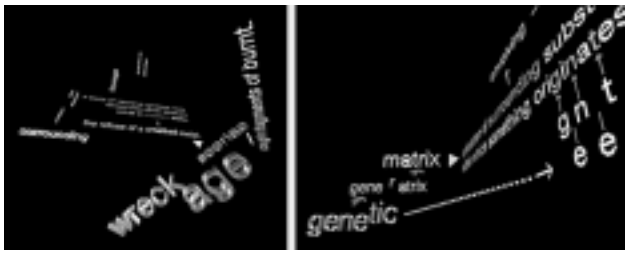

Figure 9. *Vpoem 14*.

In short, it is really hard to summarize in a linear or sequential text of this kind the alternatives of a process that is neither linear nor sequential, because is compounded by diverse simultaneities and transiencies. This difficulty possibly is not other than a practical demonstration about how limited is the technique of linear writing, inside a fixed format, in order to realize certain phenomena that are developed in a virtual space —multiple and alterable. I should recognize that the same technique of digital animation should overcome significant problems in order to confront this task with scant success.

Of course, this could not be otherwise, since what are showed here plans to be a technique of composition *characteristic* of an environment in which the mechanisms of expression of the work are very different. In the animation diverse events are exhibited successively when they have to happen simultaneously so the immersed subject could observe it by displacing him/herself inside virtual space, and in the way he/she believes more convenient, so as to achieve a multiplicity of perspectives. In this same animation many other probable alternatives for the development of the text were cut. All this happened in this way in order to achieve some degree of intelligibility in the frame of that digital animated demonstration. Digital domain of works emphasizes this problem of intelligibility since there it is much more crucial, for the simple reason that diverse simultaneous events are executed in a multidimensional environment and in an order that is not or should not to be that in which our habitual experience is developed.

5. FINAL CONSIDERATIONS

It's likely that global artificiality will bring about, within the system of arts communication, the almost simultaneous accomplishment of the roles of *emission* and *reception* in each human individual, as well as motivate the intervention of artificial intelligent entities with capacities to propose and receive events with aesthetic content, namely, events with high information. In other words, the problem generated by the emission of an artistic event produced by a human creator and the posterior reception by a public also human, will be replaced, in some degree, by a new situation generated through a *bidirectional* exchange, and *under certain conditions of equality*, between a human emitter-receiver and an artificial emitter-receiver. This new communicational process will be consolidated due to the structuring of data managed by these artificial entities which will be quite similar to the reticular disposal that facilitates the human cerebral processing. This means that the communicational process that will flourish in the artistic field (starting from the new human-machine relationship that we are foreseeing here) will be able to activate events that will also be conceived as a consequence of the action of those artificial entities, and starting from phenomena of the most diverse orders: verbal, sonic… in an *imbricated* and *cohered* way, as in fact happens in the human brain. What will have to be complemented with the fact that artwork won't be a closed object or process any longer, but rather, will evolve unceasingly and *on its owns*, endowed with a kind of *artificial life*, regardless of whether a human executioner participates or not. All these considerations allude to an extremely firm linking between the production of texts with poetic function and the digital technologies of simulation, to such a point that today poetic work can expect, in fact due to this linking, to be converted in one of the fundamental instruments for the development of the *original* languages of the very near global artificiality. Also in one of the few basic profiles that are required considering a next implementation of systems endowed with *understanding* and *common sense*, like the *Project GMG* of artificial brain ("the thinking machine") that will be shortly started at the National Technology University (UTN) of Argentina. The fact that poetic production, therefore, should end up relating in such a radical way to the artificial generation of human cognition, and, as a counterpart, that this simulation not only requires but rather could establish a method of simulated poetic production, this mostly implies that in a medium term poetic work will be a shared task between human individuals and artificial entities, always inside that virtual environment or domain that we have sought to discover in these pages. A creative task shared with and aided by these artificial entities in the same cyberspace.

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THE LABYRINTH AS A MODEL OF COMPLEXITY: THE SEMIOTICS OF HYPERMEDIA

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ABSTRACT

In this paper, we intend to approach two specific hypermedia aspects; the structure that organizes the hypertextual information, as well as the route of reading that the user creates when advancing the links of a net. Our hypothesis is that the labyrinth is present in hypermedia systems in two ways: the first, more evident, is in the own organization at the moment of the project development. The second, subtler, but not less profound, is the labyrinth that the reader is to construct when operating his choices in between the hypermedia chains. In this sense, our research will be oriented as of two principles, or two labyrinths: the potential labyrinth, present as a modular document with access "doors", "hyperlinks" to other documents; and the lived labyrinth, that which is experimented by the user at the moment of his navigation by "hyperspace". We will start our research from a revision of the theory of hypertext, to later outline parallels with the labyrinth.

General Terms

Hypermedia, Metaphor, Intertextuality

Keywords

Hypermedia, hyperspace, links, interactivity, authorship, reader, complexity, organization, metaphor

1. INTRODUCTION

Recent advents such as the expansion of the personal computer, the multimedia, CD-ROM, and Internet are raising a series of problems to be discussed in different areas of the human thought. The acquisition of a new intellectual technology makes changes in the several human activities possible, that is, its reflection is spread to different fields and implies new analogies and classifications, new practical, social, and cognitive worlds.

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2. A BRIEF INTRODUCTION TO HYPERMEDIA

2.1 Historical Antecedents

The Hypertext is a digital document in the form of a text with the specific characteristic of that different blocks of information can be consulted in an interactive and almost simultaneous manner. In general, the information contained in the hyperdocument is modular and highly indexed, tied by connections named “hyperlinks”, which allow the user to advance in his reading as he pleases. The Hypertext reader may advance the several chapters according to his interests, and even, using the resource “search”, track an entire and extensive volume of information in a matter of seconds.

Ted Nelson is considered the inventor of the term Hypertext as well as of important concepts such as the “stretch text”, which expands and contracts according to the request for further information. It was back in 1970 that Nelson developed the Xanadu System, a kind of Universal Library that allowed the sharing of ideas among people. Author of several works about Hypertext systems, among others the book “Literary Machines” [1], Nelson is, no shadow of a doubt, an enthusiast of the permutation possibilities that these systems offer.

However, several years before, in 1945, Vannevar Bush, one of the first computational scientists, was to present the main concepts of the future Hypertext in his legendary article "As we may think" [3]. According to him, the traditional information exchange systems were not efficient at all. His project “Memex”, a machine previous to the microcomputer, mixture of microfilm and photoelectric cell, was a powerful device to store data of different kinds, and already allowed links between documents. In this sense, consultation could be performed from the associative links, that is, one item could lead to another item, and so on, allowing the user to construct a trail of reading according to his interest.

As of the end of the 80’s, the term Multimedia started to become popular, in that it was seen in the most varied places. However, this term may acquire several meanings according to the context it is used. We will use the term Multimedia in its usual meaning, that is, the incorporation of several sources of information, such

as sound, texts, images, video, etc., in a same technology, the computer. Hypermedia, in turn, adds resources of interactivity to the Multimedia technology, allowing the user to navigate by several parts of an application as he pleases. As the objective of this research is to study the structure that supports the construction in Hypermedia, we will not make any distinction between the terms Hypermedia and Hypertext as, within this perspective, it is irrelevant whether an application counts with different kinds of media or not.

2.2 Theoretical Discussion on Hypermedia

The object of our research, Hypermedia, is a quite new technology; however, many of the concepts that are related to it have already been explored in other areas of the human thought. Landow, in his excellent work on hypertext, points out some relationships between the topics of literary criticism and the main characteristics of Hypermedia [6]. Themes as intertextuality, open piece, decentralization, and multivocality, all quite pertinent in regard to this new technology, have already been highly discussed and approached by authors such as Derrida, Barthes, Eco etc. It seems that Hypermedia came to bring technological meaning, that is, material and technical conditions for the making of certain poetic projects.

The character that distinguishes Hypermedia lies in the possibility of establishing connections between several media and between documents or nodes of a Net. With this, the links between documents provide a nonlinear, multifaceted thought. The Hypermedia reader is an active reader, who is all the time establishing his own relations among the several ways that the hypertext links allow him to move. As a Labyrinth to be visited, Hypermedia gives us promises of surprise, unknown tracks...

Besides, it is necessary that we make a remark in relation to the Hypertext specificity, that regarding speed. It is completely different to have access to another book, image or reference only from a click. Such tasks used to take much longer. With the infoways, today we can communicate with people who are geographically distant, consult a book in about 2000 libraries, 24 hours a day.

2.2.1 The Differentiating Characteristic:Interactivity

It would be interesting to start this part by reminding the reader that the concept of interactivity is quite old and, theoretically, every good piece of art carries this interactive potential at a metaphorical level. However, we have, with the advent of new technologies, a greater emphasis for a certain kind of interactivity. In the specific case of Hypermedia, we can point out that the work, in itself, only becomes a piece of art from the moment it is enjoyed by the reader.

Thus, the act of reading becomes the constitutive element of the work. David Rokeby, when commenting on his work “Transforming Mirrors: Interaction as a mode of artistic expression”, puts this in a quite interesting way when working with the mirror image. According to him, interactivity is defined at the moment the piece of art reflects the consequences of our action and decisions back to us. We have then the possibility of contacting our “self”, which was processed and transformed by the contact with the interactive technology. In this fashion, the most important concept in interactive art comes from the exploration of meaning that emerges from the tension between the interacting part (or reader) and the reflection of his own self. The piece of art returns to him from the experience [13].

Other authors, as Frank Popper, have already pointed out the importance of the interactive character in relation to graphic computation, providing a distinctive perfume to it. We can take this punctuation to hypermedia as it embodies the interface between the nodes of the net and the choices of the reader [11]. This, however, leads us to a new question we will look at next.

2.2.2 The Question of Authorship

Authorship, in turn, is a rather complicated concept when talking about Hypermedia. It is necessary to remember that large teams usually work in the making of a CD-ROM application. However, in the most vivid Hypermedia, performed in nets such as WWW, we have an example in which the term authorship becomes totally unfit, since in each knot of the net we are connected with a point developed by a team, and we may, the next minute, be in a different point developed by another team, and so on. Some thinkers already state that Hypermedia represents the end of the authorship era. Landow, for example, talks about the author reconfiguration, which now suffers a “self erosion” with the transfer of the authorship right to the reader, who have at his disposal a series of options of choice ahead [6].

Even the way of presenting ideas must be thought over. For instance, the author of a work in hypermedia no longer needs to present a line of argumentation. The statement, that is, the researcher thesis, only appears in the establishment of limits of inclusion and/or exclusion.

2.2.3 The Active Reader

The concept of flexible text requires and creates an active reader. “New forms of mental navigation will be necessary to reencounter oneself in the informational labyrinths in constant regeneration" [12]. In the hypertextual systems, every reader is also the author of what he is reading.

We talk about active readers, regular authors, works in permanent mutation. We may, more than ever, review the question of the classic dichotomy subject-object.

Pierre Levy dissolved this Manicheanism division in a very interesting way when he sketched the program of Cognitive Ecology. If we consider the intelligence, or cognition, as the result of complex nets in which a great number of actors interact (human, biological, and technical), the scenario of interactions allows more complex reading. The hypermedia systems allow us to builds a paradigm of theoretical possibilities.

3. THE ORGANISATION OF COMPLEXITY

The hypermedia systems represent an excellent example on the complexity paradigm. We will use the term complexity as described by Morin, that is, as something, which is woven as a whole [9]. What defines the weave of the “complexus” cloth is that it is formed by a circular game in which the binomials order/disorder, chance/determination, interaction/retroaction are conjugated in an infinite and simultaneous way.

Thus, in the concept of complexity, one cannot exclude the "simple". This is one of the most interesting paradoxes to be observed in the hypermedia systems. Each knot of the net, each "home page", each CD-ROM page must be conceived from the principles of clearness, coherence, strictness, order, and precision. In this sense, simplicity and clearness are constitutive elements, passage bridges to a greater complexity.

A hypermedia system presents as reality the articulation and organization of complexity.

We may say Hypermedia is only accomplished when there is interaction between the conjugated pairs.

That is:

- The complex order in the hypermedia systems only exists if the connection between order and disorder exists.
- The complexity, if there is simplicity;
- The random choices of the interacting part only work if the system is previously programmed, determining possible connections to specific points.
- Non-sequential search and research are only possible because there was a previous work, necessarily sequential.
- This is also true for the free, creative and fluid route. Strictness, accuracy and obedience to standards were necessary.
- The elasticity of the hypertextual systems, its capacity of expansion and retraction, is directly connected to a construction in synthetic, firm, and solid blocks.
- And finally, a quite obvious characteristic: the user can only exert his virtual mobility by the several sites if there is an immobility of sitting in front of a machine.

Thus, it is in the organizational complement between (order-disorder), (simple-complex), (random-determinism), (sequential-nonsequential), (strictness-freedom), (solidity-elasticity), (mobility-immobility), that we can view the dimension of the complexity hypermedia performs.

One of the most important methodological cares we must have when working with systems is the danger of trying to analyze them. Systems must be understood as a whole that articulates and only exists as such. In this fashion, reducing it to its most simple parts, decompose it, is like stopping conceiving it as a system.

Another concept that was very important in our investigation was organization.

Organization is intrinsically related to the idea of system. Each connection, each hypermedia link, at the same time connects, transforms, transports...

Once more, we are dealing with an extremely dense concept. In its density, we can view order and disorder. Organization, when interacting order and disorder in itself becomes more and more complex. This phenomenon can be easily observed in the paths of hypertextual reading. Suppose a quite active reader, who describes rather complex movement when moving from one link in the net to another. In spite of the path disorder, of the complicated route, a hidden order is present. This order can be found through the command "history", which redoes the complete route.

We will try, in this way, to conceive the notions of organization and complexity of the systems as a circular route ad-infinitum.

3.1 Centered, A-Centered, and Polycentric Organizations

In order the complexity of Hypermedia systems is operational and lived, the system must be conceived as an organization. When we talk about hypermedia, we are in the field of inter-relations, and it will be the organization that will make these relations possible to occur.

Organization will make possible:

- System opening and closing.
- Sequential and non-sequential coordination.
- Random and predetermined connections.
- The recording of the route and its restoring.

The organization of Hypermedia Systems is characterized for being a polycentric organization. Let us analyze, for example, Hypermedia in the WWW: each site in itself represents a center. Once more, it is the system complexity in its totality that will establish the node order and regulation. However, besides that, one may say that, in Internet, the center is everywhere and nowhere, what leads us to the definition of an a-centered system.

In the case of CD-ROM applications, we can find a variety of categories. We may say there are polycentric and acentric titles and that, in most of the cases in which there was an electronic transposition of a material, which already existed, in printed form, the centered and linear character is still predominant.

Going back to the nets, the fact that the center is everywhere and nowhere makes that the acentric and polycentric characters are conjugated simultaneously. As all acentric organization is regulated from answer from certain computing places, we have there a polycentric system. In the radicalization of this though we may conclude that every acentric system is also polycentric and vice versa.

A very interesting case to be seen concerns our own brain. For a long time, the neuron cerebral device was considered the regulating and commanding center in the vertebrate living organisms. It was believed that in these animals the organization would take place from a hierarchical system of the pyramidal type. For representing an exception in the living universe, in which organizations in the acentered and polycentric form are the majority, the centered scheme was seen as a form of evolution. However, we know today that, in fact, we are dealing with an even greater complexity and that, behind this apparent centrism there are, simultaneously, acentrisms and policentrisms. Our brain is then seen as a center, and one of the centers of a larger polycentric system, which, in turn, in its complexity is often a-centric.

With this, we are trying to conclude that centrism-acentrism-policentrism are elements which are articulated in an increasing complexity. This complexity does not exclude one characteristic

or other, but allows, through a system of exchange and dialogue with the local centers, a coherence in the system as a whole.

4. HYPERMEDIA AND THE LABYRINTH

> *"The Labyrinth invites to exegeses, and the weaving of crossroads and ramified corridors irresistibly attracts the interpreter to a thousand and one routes."*
>
> *Marcel Detienne [4]*

4.1 The Labyrinth and the Minotaur: The Revisited Myth

Labyrinth, from the Greek *Labyrinthos*, was an extremely complex structure in Crete. The word origin is probably Caria or Lydia, and comes from *Labrys*, a double cut ax. We can make two relations: the double cut ax has a religious connotation, in that it is found in stone engravings and pillars in ruins of the Minoic period. The ax that cuts in two different places is also related to the paths that are divided in the Labyrinth.

According to the Greek mythology, Minos receives from Poseidon a wonderful ox as a present. However, the God of Seas requires this animal be offered to him. The greedy Minos denies returning it. As a punishment, Aphrodite intercedes, making the queen Pasífae to terribly fall in love with the oxen. From this union, a terrible monster will come out, the Minotaur, half man, half oxen. To hide that which was the shame of Minos, the craftsman Dedalus creates the Labyrinth[1].

Artifice legendary Athenian, son of Metión, and descendent of Hefesto, God of fire and a blacksmith, Dedalus was so skillful that it was said his sculptures could move. Still in Athens, Dedalus will commit a crime because of envy. His nephew, Talos, had invented the saw and the potter's wheel. Fearful that his success would overcome him, Dedalus throws Talos off a rock. He then escapes to Crete. His attitudes are always paradoxical, because it was because of his invent that Pasífae could carry out her love with the oxen. Builder of the labyrinth, Dedalus will however teach Ariadne a way for Teseu to find his way out. As a punishment, Dedalus will be stuck in the Labyrinth with his son Icaro.

4.2 A Labyrinth Typology

Labyrinths are images that have persisted in the history of humanity since millenniums. This long, continuous and mutant permanence unveils to us deep questions of human thought. More than the common sense is used to define; the labyrinths are signs of complexity. The greatest allure of labyrinths may reside in the fact that they are paradoxical and propose, each one in its own way, opposite and varied logics.

When one speaks about labyrinths, it is good to remember that besides human constructions, there are also natural labyrinths. Among them, the caverns and the caves that, with their narrow passages, propose us trace difficulties. The shells, exemplar image of the spiral theme, are other fecund source of daydream and reverie. The flowers, and their mandalic constructions, the leaves, the roots and the rhizomes are also natural labyrinths. Labyrinth is present in our own body, in many of our organs such as the brain, the inner ear, and even at the fingerprint, unique sign of our identity.

The labyrinthine imaginary is present in several periods of mankind. One of the oldest graphical representations dated from the neoliptic age and is found in the cave of Valcamonia, Italy. Among antiquity's labyrinths, there are the Egyptian (totally destroyed, whose original plan was reconstructed by the English archeologist Flindres Petrie, in 1888) and the Cretan (immortalized by the mythical narratives of Theseus, Ariadne and Minotaur).

The sense of labyrinth has been transformed throughout time. In the Egyptian case, we have a magnificent and majestic construction, as space dedicated to the protection of the sacred. The Egyptian labyrinth was, at the same time, sanctuary and monumental representation of the power of pharaoh and sacerdotal class.

On the other hand, the Cretan labyrinth is a prison and a shelter for the monstrous. We find this thematic in nightmares producing dark and tortuous corridors, facing a double challenge: to find the right path and kill the beast.

The labyrinths built in gardens' spaces however propose another question, and another logic. In the case of Versailles' labyrinth, for example, the idea was not to question, to puzzle or to confuse visitors. The propelling purpose, that led the architect to plan garden alleys, was to provide people with fun. To emphasize this character of delight, he placed among the flowerbeds many sculptures featuring scenes of Aesop's fables.

It is therefore impossible to think of a general concept that would define the labyrinth in a single word. The classic definition of a labyrinth being such a difficult and intricate construction that the walker often loses his sense of direction and meet difficulties to reach the center, corresponds to one type of labyrinth only, and reduces the complexity involved in this theme.

Let's examine a case where the pilgrim does not have to face any doubts or question which path he should take: the labyrinths built on the ground of medieval churches, such as Chartres and Amiens cathedrals. We can say that these labyrinths do not present any problem about decision taking, as they offer one-option paths only, without any branches. Different from problematizing mazes, this kind of drawing does not present any division throughout its course. Therefore, one-course labyrinths do not offer the visitor any free choice. As there is no path to be chosen, there is no possibility to get lost, and the visitor only has to follow the circumvolutions, in and out, as they have been conceived by the architect. However, these beautiful diagrams had a deep spiritual meaning to the faithful. There were more than mere ornamental drawings: the novice who walked through these labyrinths while he was praying, tried to reach a supreme state of mental concentration. To walk through these labyrinths was a quest for a sacred space, a substitution to a pilgrimage to Holy Land.

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[1] Dedalus: from the Greek Dáidalos, "smart workman".

According to our proposition of elaborating a labyrinthine typology, this kind of labyrinth would be the first: without any forks, also called one-course labyrinth.

The second type of labyrinth, maybe the most frequent in stories and legends, corresponds to a labyrinth with crossroads. I will not spend much time on this type, as the latter has been the object of thorough research in my previous book. We will however examine some points of interest for our current discussion. In labyrinths with crossroads, the use of schemes to pave the path, such as Hop o' my thumb's pebbles or a leading thread (Ariadne's thread), are extremely useful to whom does not want to become lost. However, we have to remember that many artistic works in hypermedia consider the art of getting lost as a poetic stimulus (see web art works of Jodi and Landsbeyond).

Cyberspace labyrinth belongs to another class, another typology. It maintains characteristics of the first kind as well as of the second kind, but it goes beyond. We are here facing a rhizome-type labyrinth. A rhizome can be connected in different directions and from each of its points - so does WWW. A rhizome does not have one center only, we have got a center in all its points. Some authors refer to the very mind as an example of rhizome-type labyrinth.

4.3 The Metaphoric Issue: Theoretical Fundaments

The metaphoric discussion has long been restricted to the poetic investigation. However, as of a few years ago, this issue started to be discussed again with quite enthusiasm, especially due to the researches on Artificial Intelligence. Several authors will work the Metaphor, in that they will have opposite opinions quite frequently.

The pioneer, no shadow of a doubt, as Max Black with his famous book "Models and Metaphors" [2] in which he speaks in favor of its cognitive capacities[2].

Metaphors provide the approximation of two worlds of heterogeneous domains.

According to Ricouer states in his book *The Rule of Metaphor-Multidisciplinary Studies of the Creation of Meaning in Language*, metaphor is a model that makes a redescription of a certain subject feasible.

Among the greatest polemics, we can find divergence between Ricouer e Derrida, in that the first understands the metaphor as a meaning carrier and philosophy as a choice and development of a live and metaphysic metaphor. Derrida, in turn, describes the deceitful function of a dead metaphor. Another opposition to Ricouer, D. Davidson, denies that metaphors mean anything besides their literal meaning[3].

However, in our paper, we will be based on the following suppositions:

- The metaphor provides the possibility of having a creative and unexpected view of a certain subject.
- The metaphoric relation is frequently circular, that is, from B we have a new knowledge of A, but also what we know about B is changed by the process.
- From the metaphoric relation between A and B, it is possible to extract C, knowledge that is structured from this interrelation.

Recent studies on Cognitive Sciences go back to the issue of metaphor as the focus in the discussions on mental representations and in the construction of the Web Culture.

Holyoak and Thagard, in their book "Mental Leaps- Analogy in Creative Thought" [5] will talk about the importance of metaphoric identification. According to the authors, the metaphor provides the interaction between A "source" e B "target" This interaction is such that after the metaphoric bond, our understating is changed in relation to both A and B. The metaphor, as it forms analog schemes, is not interested in similarity or comparisons. Its basic characteristic is to conceive a category, which encompasses the two fields of knowledge. In order to exemplify such strength and comprehension, the authors show us two sentences, one metaphoric and the other comparative. To state "my job is a prison" is much stronger than saying "my job is like a prison". Besides, they will point out that the metaphor works as a factor of indirect communication and cultural agglutination.

4.4 Hypermedia as Labyrinth

Our hypothesis is that the Labyrinth offers name and image for the reflection of a technology, hypermedia. For that, we will have to assume the transdisciplinary character of our work from the start.

In our specific case, when we chose the Labyrinth to be the metaphor of Hypermedia, we intended to open paths to the understanding of this new technology from the confrontation with an extremely old and universal theme. The Labyrinth is always seen as a challenge to be faced and, many times, image of a high complexity. Fruit of logic, rational construction, the "Labyrinth is human" [15].

The Labyrinth, which is formed in the nets such as WWW, with its several paths and deviations, may be seen as a result of the expression of user's desires. Interests that are raised by a subtle curiosity, in the Labyrinth of the nets one needs, more than ever, powerful "Search" tools, as well as a program that records his steps, leaves traces. One can prudently follow the "Theorem of

[2] Out of curiosity, in our researches on the Labyrinth, we found another book by the same author, about languages, where the Labyrinth image is used as an argumentation pretext. In The Labyrinth of Languages, Black talks about the language Babel, the ineffectiveness of artificial language, such as "Esperanto" propagation. To conclude, Black states the Language Labyrinth does not have Ariadne´s thread.

[3] For a panorama of several discussions on Metaphor, see S. Sacks [16]; which corresponds to the minutes of the congress "Metaphor: The Conceptual Leap", University of Chicago, 1978.

Wise Ariadne" and try to return to his own steps. One can also assume the "Theorem of Mad Ariadne", and try to know the greatest number of ways [7].

5. CONCLUSION

> *"An extremely confusing area, a net of streets, that for years I had avoided, became to me, in one strike, reachable in a view of the whole, when, one day, my beloved moved there. It was as if, by her window, a projector were installed and decomposed the area with beams of light."*
>
> *Walter Benjamin*

An entire vast field for the acquisition and articulation of knowledge is open with the hypermedia technology. Because of the non-linear architecture of its memories, the computer makes the reading of texts that are in different parts of a document, as well as in a different address, possible.

In this sense, the research work counts now with the friendly interaction that the information support of hypertext provides us. The iconic representation of the information structure and its commands, (which would correspond to the establishment of the international convertible writing Benjamin talks about), as well as the possibility of a non-linear search open new cognitive media. This possibility of concentration, focus on our interest points provides, no shadow of a doubt, light to confusing roads.

We can, more than ever, promote dialogs between several subjects, travel by foreign countries, navigate into unknown seas... In this contact with distinctive media and documents, in this interfacing, as Levy would put it, connections and reinterpretations may be lived. The transdisciplinary thought Edgar Morin talks about has a fertile soil to be developed:

"I am not interested in synthesis, but in a transdisciplinary thought, a thought that is not broken by the frontiers between disciplines. I am interested in the multidimensional phenomenon, and not the discipline that cuts out a dimension of this phenomenon. Everything which is human is, at the same time, psychic, sociological, economic, historical, demographic. It is important that these aspects are not separated, but rather concur to a poliocular vision." [9, p.35]

Not forgetting that an intellectual technology must always be studied with a connected multiplicity, as a net of interfaces open to connections and transmutations, hypermedia systems are, to us, a guide to the Labyrinths of the nets, the Ariadne´s thread that helps us to find what we wished, our Minotaur, as well as unexpected crossroads...

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Drawing on the Web

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Flash! Saviour of the universe? Well perhaps not. As a proprietary format the software does present ethical problems about the control of information but Flash does offer artists new aesthetics. These are not necessarily new ideas, the concept of object orientated programming has been around since Plato's universals and particulars, but their application in artistic product is new. In this paper I will outline the issues that concern me as an artist making work for the web.

There is obviously a conflict of interests in producing a printed description of web work, you should view the work on line at http://www.eatmydata.com

Vector graphics == small file size. Great! Now everyone can create a "skip intro" home page. But vectors do more for drawing than looping a line across the screen. Vectors create disembodied information; instant pop art but without Warhol's carelesss brush strokes or Liechtenstein's uneven dots. There is no touch of genius in flash, in a swf movie the viewer can't see the hand that created it. The personal mark making of the hero has been removed, just as type denied the scribe a final flourish.

Pop art fell short by selling limited editions that were messed up by the master. Instead of entering a world of signs pop art entered the market place and sold themselves. Digital work cannot be commodified because it is infinitely reproducible. If I copy an artist's DVD, let's say number 29 in an edition of 100, does my clone of number 29 inaccurately represent the artist's work?

Vectors are even less of a physical commodity; they are just the outline of an idea. Vectors indicate a thought, or suggest a sign instead of pixelating some physical stain.

So is flash just illustration. Traditional fine art media has a strong association with specific materials, ie: the canvas, oil paint but digital media doesn't differentiate between the medium and the message.

Isometric perspective has no vanishing points so objects do not recede into the distance. Cool. This makes it easier to animate objects in a virtual space. Which is great for simple gaming like the zx spectrum or even for complex games like Age of Empires.

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The knight can kill Persians in the south and maintain the same dimensions he was when killing Celts in the north. So after all that fuss in the middle ages the world really is flat. Everything is equal. Where Renaissance composition used perspective to draw the eye to important points in the picture plane, to important points in the propaganda, isometric space tells the viewer that everything is equal.

Isometric space places images into the perspective of our world. With the end of Communism and Christianity there are no big narratives, just small lobbying interests. There are no heroes to save us. An elevated map reflects the need for information rather than instruction.

As everything is equal so everything is also isolated. The browser enforces the vignette. Objects float in the middle of the screen with no relationship to either the edge of the browser or the monitor. The designer can justify top and left but that still makes the object a partial vignette. Objects are related to other objects by links and associations but they have no spatial relationship to what is outside of themselves.

In print the paper comes first and the drawing fits the page. On the web the idea comes first and the user views it through one of many browsers. When drawing objects for the web the artist must start in the center and work out. Which is difficult when you've been whacked in life studies for drawing the body floating in space. But web objects do float in space; they have no environment to relate to, they are not part of the browser, the browser is just a spy glass.

Browsers are portals to ideas and the ideas should not be artificially framed they should exist as freestanding thoughts or signs. Unlike bitmaps vectors are scalable and adapt to the user's browser and screen resolution, they have no fixed dimensions.

The web is goal orientated. Despite the great multi-media experience that the web once promised it has become a functional information retrieval system. In fact there are more ways to retrieve information than there is information. This is another old idea; the map being bigger than the land it surveys. But now it's a reality and cultural forms must address database navigation, which is difficult when we've been conditioned by the gratuitous content creation of the Twentieth Century. How many times can we watch the hero take twelve steps to get from A to B? What if the hero is an isolated individual, the same as everyone else with a multitude of options?

The hero is confronted with a vast warehouse of information and making choices becomes difficult. Equality of information is difficult unless people are skilled in choosing. Flash isn't marketed as tool for conceptual artists, it's a "Lets Make an animation for the web" design engine. Flash could be used to create intelligent navigation systems. Flash could be used to make art.

CrossTalk: An Interactive Installation with Animated Presentation Agents

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ABSTRACT
In this paper, we describe CrossTalk, an interactive installation in which the virtual fair hostess Cyberella presents and explains the idea of simulated dialogues among animated agents to present product information. In particular, Cyberella introduces two further virtual agents, Tina and Ritchie who engage in a car-sales dialogue. Cyberella on the one hand, and Tina and Ritchie on the other hand live on two physically separated screens which are spatially arranged as to form a triangle with the user. The name "CrossTalk" underlines the fact that different animated agents have cross-screen conversations amongst themselves. From the point of view of information presentation CrossTalk explores a meta-theater metaphor that let agents live beyond the actual presentation, as professional actors, enriching the interactive experience of the user with unexpected intermezzi and rehearsal periods. CrossTalk is designed as an interactive installation for public spaces, such as an exhibition, a trade fair, or a kiosk space.

Categories and Subject Descriptors
J.5 [**Arts and Humanities**]: Performing arts (with virtual actors).

General Terms
Design, Experimentation

Keywords
Virtual conversational characters, interactive installation

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1. BACKGROUND
The last decade has seen a general trend in HCI to make human-computer dialogue more like human-human dialogue. Computers are ever less viewed as tools and ever more as partners or assistants to whom tasks may be delegated. Trying to imitate the skills of human presenters, some R&D projects have begun to deploy animated agents (or characters) in wide range of different application areas including e-Commerce, entertainment, personal assistants, training / electronic learning environments [4, 9]. Based either on cartoon drawings, recorded video images of persons, or 3D body models, such agents provide a promising option for interface development as they allow us to draw on communication and interaction styles with which humans are already familiar.

Figure 1. The presentation agent Cyberella.

1.1 Cyberella
Starting with the development of the so-called PPP Persona presentation agent [14] back in 1994, our group has designed a number of animated conversational characters for a variety of different application tasks, including Cyberella (cf. Figure 1), a

female synthetic conversational character working as a receptionist [6]. A user can engage with Cyberella in a typical receptionist conversation, e.g., by asking her about directions how to get to the office of a certain staff member. However, Cyberella is an affective character and may well react emotionally to a visitor's utterances [2, 6].

1.2 Using Multiple Characters

Most of the current applications assume settings in which the agent addresses the user directly as if it were a face-to-face conversation between human beings [4]. Such a setting seems quite appropriate for a number of applications that draw on a distinguished agent-user relationship. For example, an agent may serve as a personal tutor or as a guide as in the case of Cyberella.

There are also situations in which the emulation of a direct agent-to-user communication - from the perspective of the user - is not necessarily the most effective and most convenient way to present information.

Inspired by the evolution of TV commercials over the past 40 years, our group has discovered role plays with synthetic characters as a promising format for presenting information. A typical TV-commercial of the early days featured a sales person who presented a product by enumerating its positive features – quite similar to what synthetic characters do on web pages today. On TV, however, this format has been almost completely replaced by formats that draw on the concept of short, but entertaining episodes or sketches. Typically, such performances embed product information into a narrative context that involves two or more human actors. One of the reasons that may have contributed to the evolution of commercial formats is certainly the fact that episodes offer a much richer basis compared to the plain enumeration of product features, and thus meets the commercial industry's high demand for originality and unseen spots. We propose a shift from single character settings towards interactive performances given by a team of characters as a new form of presentation. The use of presentation teams bears a number of advantages.

First of all, they enrich the repertoire of possible communication strategies. For example, they allow us to convey certain rhetorical relationships, such as pros and cons, in a more canonical manner. Furthermore, they can serve as a rhetorical device that allows for a reinforcement of beliefs. For instance, they enable us to repeat the same piece of information in a less monotonous and perhaps more convincing manner simply by employing different agents to convey it.

Using multiple characters is also a good means to convey social aspects, such as interpersonal relationships between emotional characters, e.g., see [13, 15].

Last but not least, the single members of a presentation team can serve as indices which help the user to organize the conveyed information. For instance, we may convey meta-information, such as the origin of information, or present information from different points of view, e.g. from the point of view of a businessman or the point of view of a traveler.

Looking at past and current projects conducted at DFKI we observe an ongoing evolution of character-based presentation systems. This evolution starts from systems like PPP in which a single character presents information content in the style of a TV-presenter. It continued with systems in which role plays with several characters are used to convey information, and it will bring about interactive systems that invite the user to barge-in ongoing conversations among multiple characters.

1.3 The "Inhabited Market Place"

The Inhabited Market Place (IMP, [1]) is an example of a system that employs presentation teams to convey information about products like cars. As the name indicates, IMP is a virtual place, e.g., a showroom, where seller agents provide product information to potential buyer agents in form of a typical multi-party sales dialogue. The user who observes the simulated dialogue will learn about the features of a car.

From the point of view of the system, the presentation goal is to provide the user with facts about a certain car. However, the presentation is neither just a mere enumeration of the plain facts about the car, nor does it assume a fixed course of the dialogue between the involved agents. Rather, IMP supports the concept of adaptivity. It allows the user to specify prior to a presentation (a) the agents' role, (b) their attitude towards the product (in our case a car), (c) their initial status, (d) their personality profile and (d) their interests. Taking into account these settings, a variety of different sales dialogues can be generated for one and the same product.

Figure 2. The agents Tina and Ritchie engaging in a car sales dialogue in the IMP.

1.4 CrossTalk

Seeking for potential exhibits that could be demonstrated at the CeBIT 2002 computer fair, both the Cyberella system as well as the Inhabited Market Place were favored candidates. During the discussions who of the staff members would be willing to serve at the stand the question arose, why not delegate this task to Cyberella and have her present the Inhabited Market Place on behalf of us. The combination of the two systems resulted in the interactive CrossTalk installation.

A major conceptual contribution of CrossTalk is the introduction of a meta-theater metaphor, taking forward the "computers-as-

theatre" paradigm that has been originally presented by Brenda Laurel [12] and since applied by others too, e.g., [7, 11]. Our motivation for introducing the meta-theater metaphor is a practical one. We consider it as a good means to raise the visitor's attention and to enhance his/her interactive experience with animated presentation agents.

2. FUNCTIONAL DESCRIPTION OF CROSSTALK

As sketched in Figure 3, CrossTalk has three main components that are spatially arranged in the form of a triangle:

- the screen of the Cyberella system;
- the screen of the Inhabited Market Place;
- a centre control stand with a touch screen mounted on top, and a camera that notices approaching and leaving visitors.

At the CeBIT booth two 17" LCD monitors were used for the display of the characters. Figure 4 shows a snapshot of the installation taken at the CeBIT stand. While other projection techniques, e.g., data beamers, might be used as well, the display screens should be positioned as shown in the sketch of Figure 3 in order to create the impression of a cross-screen conversation among Cyberella and the couple Tina and Ritchie.

2.1 Basic Role Castings in CrossTalk

In CrossTalk Cyberella's primary task is that of a fair hostess. She welcomes visitors who approach the stand and offer them a demonstration of the Inhabited Market Place (IMP) which she can show on the opposing screen.

In addition, Cyberella plays the role of a mediator between the human stand visitor and the IMP application. For instance, IMP allows a user to set the mood of the agents involved in a product presentation. However, in CrossTalk the visitor does not interact directly with the IMP system. Rather Cyberella will ask the user what settings to chose and then passes the user's input on to the IMP.

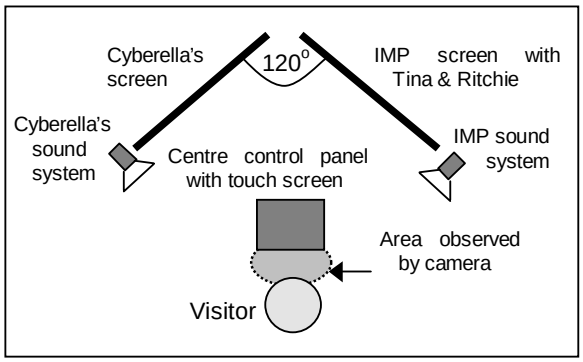

Figure 3. Main components and spatial layout of the CrossTalk installation.

Figure 4. Snapshot of the CrossTalk installation at the CeBIT 2002 fair. The two screens in the back belong to the Cyberella system (left) and the IMP System (right). A visitor can interact with Cyberella via the touch screen in the front.

In contrast, Tina and Ritchie live in the IMP and interchangeably take on the role of a car seller or a potential car buyer. Once triggered by Cyberella to perform a sales dialogue, Tina and Ritchie work through the features of a certain car by means of a question-answering dialogue. Clearly notable variations in the course of such dialogues are due to the specific settings of the agent's current mood. As mentioned above, such settings can be provided by the stand visitor by the way of Cyberella.

2.2 Presentation versus "Off-Duty" Mode

When manning a stand at a tradeshow it is quite natural for the staff members to switch back and forth between presentation activities and more private conversations with colleagues, e.g., when no visitor is present or particularly interested in getting a demo. In CrossTalk, we emulate such a switch between an active presentation mode on the one hand, and an off-duty mode on the other hand.

Tina and Ritchie will switch to presentation mode, too. They are now ready to perform another car sales dialogue. That is, the buyer agent will ask particular questions about a car on display.

When a visitor approaches the centre control stand of the installation (cf. Figures 3 and 4), she/he gets recognised by a camera system mounted below the touch screen of the centre control panel. The camera permanently observes an area of the panel's front side. A "visitor recognised" event will then trigger Cyberella and have her switch to presentation mode. That is, she will greet the interested visitor and offer a presentation of the IMP system.

In response, the seller agent will highlight and explain features of the car that relate to the buyer's questions. Depending on their mood settings, both the buyer and seller will comment on the mentioned car attributes either in a positive or negative way.

In contrast, when a visitor leaves the area close to the centre control stand, a "visitor gone" event is sent to Cyberella. In turn, Cyberella will inform Tina and Ritchie that they can interrupt their car-sales performance and switch to "off-duty" mode.

In off-duty mode the characters still keep acting and talking. This time, however, they either engage in a small talk or start exercising car sales performances. The motivation for including this mode is twofold. Firstly, talking characters are more likely to attract new visitors to come close to the installation, i.e., close enough to get noticed by Cyberella (the camera). Secondly, visitors may step a bit back (i.e., they are no longer seen by the camera) but still watch what the characters do. Switching from presentation mode to off-duty mode often raises the interest of the leaving visitor again since they are now curious what else the characters can talk about.

3. SCRIPTING OF CONVERSATIONS

As indicated in the introduction, the CrossTalk installation has emerged from the combination of the two stand-alone systems Cyberella and IMP.

The Cyberella system comprises a natural language dialogue component that analyses textual input from the user, performs a domain-specific semantic interpretation of input sentences, and generates appropriate responses which are either verbal, gestural or by facial expression. Technical details about the Cyberella system can be found in [2, 6].

In the case of IMP, the dialogue contributions of all agents participating in a car-sales talk are determined by a centralised action planner. The task of this component can be compared with the task of a script writer who acts out all parts and dialogue contributions for the actors in a theatre play.

Of course, in order to obtain a believable result, the script writer, as well as our automated planning component, have to consider the knowledge and personalities of all characters and must be able to anticipate a reasonable unfolding of the scene. Since the car sales domain is a relatively closed domain, a broad variation of car sales dialogues can be automatically generated by means of a relatively small number of dialogue patterns. The current IMP system comprises approximately 30 planning operators to represent typical dialogue moves in this domain. For a more detailed description of the underlying planning approach we refer to [1, 3].

Compared to the original versions of Cyberella and IMP, the perhaps most interesting feature of CrossTalk manifests itself in the smooth interleaving of pre-scripted subdialogues with fully automatically generated car-sales dialogues.

3.1 Pre-scripted Sub-Dialogues

While a broad variation of car sales dialogues can be automatically generated by means of a relatively small number of dialogue patterns, an approach for the automated generation of small talk dialogues (which would be interesting enough for a visitor to listen to) appears much more challenging. We therefore decided to rely on a pre-authored repertoire of scripted small-talk scenes from which the system would randomly chose when in off-duty mode.

A total of 180 different scenes were composed by one of the authors with experience in theater acting and directing. Some scenes cover themes related to every-day belongings, such as what to do in the evening, how to get home, or where to get cigarettes. Other scenes refer to the world of the theater or movies. So the agents may reflect on their stagecraft, or what to do professionally after the CeBIT convention. An excerpt of a pre-authored episode is shown in Figure 5.

The specification of such pre-authored dialogues can also include special tags. Some of these tags allow an author to explicitly specify an agent's non-verbal behaviour, such as the agent's gaze, gesturing, and body postures. The set of gestures for the CrossTalk agents come from a repertoire based on empirical studies by Kipp [10]. For all three agents the set of gestures and postures has been modelled by a professional animator and turned into libraries of animation clips. Figure 6 shows an excerpt of a pre-scripted episode including tags to specify the agent's non-verbal behaviour.

…

Tina: I'm so happy when this is over.

Cyb: What are you going to do next?

Tina: Got a job offer from Neckermann.

Cyb: Let me guess, something to do with online catalogues?

Ritchie: <laughter>

Tina: Yeah, something like that.

Ritchie: You're kidding, aren't you?

...

Figure 5. Excerpt of a pre-authored dialogue.

Scene: OFF-Chat stage-direction
… …
Ritchie: [TINA AS_LookLeft] Ok, if you are interested leave me your number. [V_LookToCy]
Tina: Well, <Pau=300> ok. [RITCHIE V_LookToActor] Sounds ... great. [AS_Glasses] I'll think about it.
Cyberella: [GS_Chide] My agent will contact you.
Ritchie: Yeah. Sure. [GS_DoubtShrug] All right.

Figure 6. Excerpt of a pre-authored dialogue including tags that specify non-verbal behaviour.

A further set of tags concern the control of the interactive touch screen. For instance, an author can specify which graphics and input menus should be displayed on the touch screen at a certain point in time. This way, screens that solicit user input can be synchronized with accompanying utterances and gestures of Cyberella.

For the convenience of the writer of pre-scripted episodes, a dialogue compiler has been developed that takes as input a written dialogue script, just as shown in Figure 6, and converts it to an internal representation that can be understood by the dialogue planner. That is, the dialogue segment will be represented by means of a planning operator. When selected in the planning phase, the operator adds the corresponding dialogue segment to the overall script.

3.2 Interweaving Pre-scripted Dialogues with Automated Scripting

In off-duty mode, the agents usually perform a random sequence of pre-scripted scenes (small talk). A special kind of off-duty conversations, however, is achieved by combining pre-scripted episodes with automatically generated car sales talks. The idea is that, when in off-duty mode, the agents may "rehearse" car sales dialogues. In such a "rehearsal", Tina and Ritchie start performing an arbitrary part of the car sales dialogue which is at some point interrupted by a *rehearsal crisis*: for instance, the actors start arguing about pronunciation or the correct version of a text passage, or one of them "forgot" what to say next. After a crisis has been resolved the rehearsal continues in a regular way.

Technically, a rehearsal consists of a chunk of generated car sales dialogue where a pre-scripted scene, the rehearsal crisis, is inserted. An excerpt of a sample rehearsal with a "crisis" is shown in Figure 7. In the scenario Tina acts as a virtual customer who wants to get information about a certain car from Ritchie acting as a virtual car dealer.

…

Tina: How fast can it drive ?

Ritchie: This is a fast car. Maximum speed is 180 KM/H

Tina: *Ahm. What else could I ask ?*

Ritchie: *Everything. Ask me whether you may invite me for dinner.*

Tina: *<laughter>*

Cyb: *Hey guys, come on, that's not in the script!*

Tina: *Ok.*

Tina: Does it has leather seats ?

Ritchie: Of course. It's a very luxurious car.

...

Figure 7. Excerpt of an automatically generated rehearsal dialogue with an inserted crisis part (in italics) that has been pre-authored.

4. CONCLUSIONS

Originally CrossTalk was developed for the CeBIT convention with the objective to attract CeBIT visitors and motivate them to enter the DFKI booth. Up to now, no formal evaluation of the installation has been performed – neither during the CeBIT nor at other occasions[1] where the system has been demonstrated to a public audience. However, we have observed several interesting reactions from people who have seen the system:

- Most visitors found the installation entertaining, some of them spending more than 15 minutes to watch the characters. Especially the interweavement of the two modes obviously increased the entertaining value of the system.
- Visitors observing the characters in both off-duty and interaction mode reported that watching the characters doing small-talk was more interesting instead of listening to car sales dialogues. This was not really a surprise, since the off-duty scenes contain jokes and personal comments.
- Since the small-talk conversations and the rehearsal crisis dialogues were pre-authored, we were concerned that some of our colleagues who had to share the CeBIT booth for several days with the talking characters could get tired of the installation. However, this fear was unwarranted. Since there

[1] Among these occasions was an open-house event in the context of the Girls Day initiative of the German Ministry for Education and Research for girls between 10-18 years.

was a large number of pre-authored scripts which were randomly selected, there was a relatively small repletion rate per day which was almost not noticed by the stand personnel.

- The cross-screen conversation between Cyberella and the actors Tina and Ritchie achieved a high level of believability. Consequently many users assumed that they could give verbal responses, when prompted by Cyberella. This situation even occurred in cases, when visitors were explicitly told that feedback could be given via the touch screen only.

We conclude that the installation suffices its purposes but at the same time see many opportunities to extend and improve CrossTalk further. As pointed out in the previous section, many both visitors wished to talk to Cyberella which would require the addition of a speech interface. As suggested by Cassell and Bickmore [5]. Cyberella may also switch back and forth between a task-oriented presentation mode and a small-talk mode when engaging in a conversation with a visitor.

5. TECHNICALITIES

As mentioned above, CrossTalk emerged from a combination of the preexisting Cyberella system and the IMP system. To combine these two systems and also to include a touch screen interface, an information router based on TCP/IP sockets builds the backbone for the CrossTalk components. For the sake of performance, we recommend the run the three main components of CrossTalk's (i.e., Cyberella, IMP, and the user interface to Cyberella) on different PCs. However, CrossTalk does not require any special hardware rather than ordinary PC's and three separate screens. As sketched in Figure 3, a spatial separation of the display screens for Cyberella on the one hand, and Tina and Ritchie on the other hand is essential to convey the impression of a cross-screen conversation.

Most software components of CrossTalk are implemented in Java. The implementation of the dialogue planner is based on the Java-based JAM Agents architecture framework [9]. The outcome of the planning process are commands to be executed by the agents.

All our animated characters have been designed by one of the co-authors who works as a visual artist and animator. While the single frames of the Cyberella character are drawn by hand and animated with Macromedia's Director, Tina and Ritchie are 3D characters that have been modeled and animated with the tool 3D-Studio Max. Within CrossTalk we use the Microsoft Agent Toolkit[2] for the runtime animation of the characters and the L&H TTS3000 text-to-speech engine for speech synthesis.

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[2] http://www.microsoft.com/msagent

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The New Image: On the Temporality of Photographic Representation after Digitalization

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ABSTRACT
Setting off from the post-photography debate and its notions of a general crisis of representation, this article discusses the temporal relationship between image and referential reality in photographic representation; first, that is generally in terms of the semiotic concepts of icon and index, secondly in a retrospect of Pier Paolo Pasolini's heretically realist contribution to film semiotics, and thirdly in a general discussion on notions of temporality in theories of photographic representation with special reference to new media. The point made is that notions of iconicity and especially indexicality call for a systematical reconsideration after the post-photography critique, and that a stronger concept of indexicality may serve as a theoretical framework to systematize photographic representation in terms of grammatical tenses. Finally, Pasolini's theory of a cinematographic foundation of meaning is reconsidered more generally in terms of post-photography and digital aesthetics.

Keywords
Pictorial Semiotics, Cinema, Photography, Digitalization, Post-Photography, Temporality

1. INTRODUCTION
What is an "image" today? In connection with the recent debate on the digitalization of photography and the so-called "post-photographic" image, we learned that the photograph, the "chemical photograph" (or in any case our idea of it) was "dead" and that we were now entering a new "post-photographic" culture. It was a culture in which images could be conceptualized independently of the idea of photographic representation, since digitalization meant that even photography-like images could be produced without the chemical technique of photography.

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The message, announced among others by photographer Sue Davis, quickly came to appear as a paraphrased echo of the painter Paul Delacroche's excited conclusion in 1839 in connection with the invention of the photograph: 'From now on, painting is dead!' Even though the critics of post-photography certainly to a certain degree had an ontological errand, and with good reason-for digital photographs were in fact very different from the "chemical" ones —the critique, as a fine representative, Danish theorist of photography, Lars Kiel Bertelsen, could celebrate in, was char-acterized more by a new creativity and general theoretical liberation of the photograph than by `the desire of the modernist aesthetics to define the media-specific ontologies, i.e., to determine how the photograph differed from other types of pictures.' [6: 9, my translation]

2. PHOTOGRAPHIC "EPISTEMOLOGY"
That this theoretical liberation came to concern the "Image" in general seemed to be clear for several observers, including Bertelsen himself, who believed that the postphotographic debate reflected a general "collapse of the logic of representation" [6:10ff] more than the consequences of the new technology, i.e., digitalization. Above all, "Photography" had been the name of an idealization of pictorial representation, rather than that of a particular medium. And what's more, rather than repeating the perhaps somewhat too rigid epochmaking pronouncements so characteristic of the critics of the post-photograph, Bertelsen, taking a point of departure in Adorno's thesis that each new insight automatically has a retroactive effect, attempted to demonstrate that the photograph could be said to have been "post-photographic" since its birth [6:10]; i.e., that the characteristics of the post-photograph that critics have attributed to digital photography may perhaps in fact be considered to be intrinsic to the photograph itself, as this has been described critically and applied creatively through its approximately 150 years' history. Bertelsen argues that the photograph, as both a popular cultural and theoretical attitude, was `a dream and a collective illusion which has served an entire ideological project. We have had a need for it. It has been a part of the construction which supported the general view of what an *image* was' [4:14]. The "image" *qua* photography was in this context the chemical and therefore "uncoded" and "authentic" imprint of a positive

given reality; it had a raw and vulgar character which early in the history of photography and cinema prevented—but with among others Andre Bazin and the other realists of film theory later made possible—the adoption of photographic media as possible art forms.[1]

Here I shall not go into any more detail regarding the content of this photograph or image's ideological phantasm. The topic is well described by the materialistic and later postmodern ideology critique and thereby in much of the body of literature now known as the critique of the visual culture. What is important, however, is to point out that even though the traditional concept of photography may have been illusory, and in any case restrictive to our theoretical world view, "Photography"— just as "Cinema"—has been something more than simply the designation of a specific artistic form; indeed, if anything, these media have been the modern way of not only to "conceiving" of the image, *but also of the world*. For Walter Benjamin, the photograph and the film were the modern media *par excellence*. The photograph, in its "simple", indexical concept, is central in connection with the transition from a culture where experience has been communicated orally, through narratives, to a culture where transmission took place in terms of writing and images. In retrospect, the photograph's stage of imprints and traces appears emblematic for the artists and critics of the modern era, who, after Charles Baudelaire and subsequently Benjamin, saw the new urban visual culture as a world of images, of signs. For Gilles Deleuze, film was the reflexive medium of the 20t" century, its philosophy. Only when the images became alive—*moving* images—did they give a true reflection of nature itself; not the eternal and unchanging ideal figures of geometry, but infinite being, becoming. And after the culmination of the strict diegetic Hollywood montage at the start of the 1940s, film art experienced a gradual liberation of the shot, that is the film image; perhaps then for the first time it was possible to cultivate a true image of Time as fleeting and transitory. This topic became richly thematicized by the "new cinemas" after the Second World War, with the Italian *neo*-realism, Jean Luc Godard and the *French nouvelle wage*, Andy Warhol's *N*ew American Cinema, and Wim Wenders and others' *Neue* Deutsche Kino; projects which all had in common the fact that narrativity was challenged by the media itself in the form of the film shot with its open temporality and materiality.[2]

3. GROUNDING PHOTOGRAPHY AFTER POST-PHOTOGRAPHY

This view over the modern theoretical status of photographic representation seems in itself to indicate that "the Photograph", the "chemical" photograph, is more complicated than what one would immediately surmise on the basis of the visual culture and post-photography critique. Conversely, we should emphasize that these "photographic" modes of "conceiving" the world are not especially compatible with a traditional concept of representation. The problem of the post-photographic critique was perhaps enough so that to a certain degree, one comes to *blend concepts of representation and indexicality*. The ("chemical") photographic image's indexical character was to a special degree problematized during the post-photography debate. The indexical character of photography—i.e., that its logic of signification is based on a proximity (i.e., contiguity) or part-whole relationship (i.e., factorality [18:40ff] between image and referent, between sign and object (Charles Sanders Peirce, as known, used the photograph as example of the indexical sign aspect)—was based on the idea that the photographic image is an optical and chemical imprint of an object, like smoke from a fire, or a foot step in the snow). However, "after digitalization", an indexical character of photography was seen only as a possible effect in the image; an effect that of its "digital production". Accordingly, in this ideal conception, the post-photography-critique asserted that the postphotographic image was "more iconic than indexical", and one could by extension conclude that the digital photograph was more related to painting than to the chemical photograph. With the special "iconic" digital photography, pictorial art could thus liberate itself from the photograph's unavoidable indexical theme of "realityimage" and eventually "devote itself to a content independent of the medium".

Regrettably, this application of the semiotic conceptual apparatus is somewhat reductionist. Despite elements of truth, when the commentators of the post-photograph argue that the digital photograph is relatively less *indexical* than the chemical, it was of course mistaken to assert that pictorial art in general does not under all circumstances contain iconic, indexical, and symbolic aspects. Whether "chemical" or digital, a photographic picture is always first and foremost iconic. As Göran Sonesson argues, one could not identify the possible indexical character of a picture if it was not for a more fundamental similarity between the sign and object, that is, an iconic sign relation [19:22-23]. Further, it ought to be clear, that the "indexicalities" which characterize photographic representation, as conceptualized for example by Benjamin, Barthes and Deleuze, are internally very different. It is therefore unfortunate to avoid the indexicality problem. An important aspect in the indexicality of the photographic image is

[1]Owing to its inherent automatism and realism as a "simple recording" of reality, it was commonly believed that photographic representation was connected with Nature in its crude materiality and therefore unsuitable as an artistic medium. In film theory, this problem is the starting point for Hugo Münsterberg, recognized as one of the earliest theorists of this medium. In his most important work, The Photoplay: A Psychological Study (New York, 1916), Münsterberg anticipates twenty-five years of development by assuming that only as a narrative medium can cinema find itself as a "true" medium in the mind of Man. When film studies looks back upon the development of film art until the fully developed Hollywood cinema of the early Forties, the telos of cinema is usually thought of as narrativity.

[2] This is the point of departure for Catherine Russell's analysis of these "new cinema waves" [17]

not just that of reality → image (i.e., the "movement" from "reality" to "image-traces" of reality; but also the relation between image and reality. This relationship is not symmetrical! The problem in much "indexical" theory of photography is that as regards the photographic image's logic of signification, no distinction has been made between the possible indexical theme in photographs (i.e., image → reality), where a point of departure is taken in the actual image, and the "myth" or story of the indexicality, where the indexical theme comes to apply to the photograph as such, i.e., as artistic form (i.e., reality → image). It is clear that an indexical thematicization must *ground itself* in the "myth" of indexicality, that is the deep cultural perception of photography (hence Peirce's concept of grounding). But this does not mean that the characteristic indexicality of the photographic image (which under any circumstances may be *thematized* and thus has important potentials for thematicization, also for digital photographs) should necessarily be conceived as representation. On the contrary, to conceive of the indexical as "simply" a *relation* between the image and the world is not only more precise; it is also conceptual liberation of the possibilities to conceive the relationship between image and the world, or even between the image and thinking (cognition) and between the image and society (communication). Seen in retrospect, postphotography critic Lars Kiel Bertelsen was undoubtedly correct when he observed that the post-photography debate was due less to digitalization than to a general collapse of the logic of representation. That this collapse had its origin in the very concept of representation itself, however, seems to be increasingly clear.

This situation was hardly so evident to critics of the post-photographic image; a situation due to this somewhat reductionist application of the semiotic conceptual apparatus. That it was observed that the digital photography was more *iconic* than indexical and thus to a greater degree related to the painting and the "genuine pictorial art" [4:17] could not simply have been on the background of the fact that the indexical aspect theme should automatically be dissolved by digitalization (the photograph was certainly labeled indexical by its physical and chemical relation of intimacy to the referent). This would have been too naive! That the "iconic" digital photograph could theoretically and artistically liberate itself from the chemical photograph was precisely by virtue of what one could call a photograph's second "loss of innocence": that from this point, it was possible to simulate a photographic presentation independent of the chemical photographic recording act, that is, one need no longer accept an apparently truthful "photograph" as the real thing. What was achieved, however, was (of course) not a kind of "natural" iconicity whereby the artist could devote himself to a "content" independent of the medium. On the contrary, the experience of digitalization consisted of *an unavoidable, extra thematicization of the medium* with reference to the possibility for digital simulation—a possibility for which the morphing technique, if anything became the exponent. It was the experience of this unavoidability which legitimized the ability, with digitalization, to speak of an "after" photography, i.e., of a *post*-photography. One could thus say that this digitalization in reality consisted "only" of the fact that the iconic theme—eventually!—added itself to the indexical one in the basic mythology of "Photography" as a specific pictorial medium.

Whether all this concerns something like an "Ontology of the Photograph" or "Ontology of the Image" is perhaps not so essential; perhaps this question is even misleading. The point is that in the mythology of the photograph, both the indexical and the iconic themes are experientially constituted. In this sense, the "Photograph" concerns a special degree of understanding, about epistemology. The question after digitalization and the critique of the post-photographic image must be: Can one, after the "death" of photography, still say that by extension of a modern tradition from Benjamin to Deleuze, we "conceive" of the world with the help of photographic images even though these images have been liberated from a traditional concept of representation? And if so, do we think about the world differently with so-called digital photographs than with the chemical ones? These questions, as far as I can see, are not clearly formulated in the debate around the photograph. This is regrettable, for they seem to point to interesting factors concerning image, world, and thought; factors which are not perhaps so strange even for Photography "as such". In this sense, it is tempting to pursue Adorno's thesis of the retroactive effect of new insights: where the chemical photograph realized the impressionists' dream of achieving an absolute self-reflexivity on behalf of the world ("to show the world as it really is" by making available its neutral, purely positive photographic image), can one then not say that *the digital image realizes the conceptualists' dream of an absolute self-reflexivity on behalf of the image?*—that is, to show the image "as it is really is" by making available a neutral world; a "world" here understood—not as "content" of a kind of purely iconic mediation (Peirce's "hypo-icon"); but as a completely mediated, neutral thematic possibility. Following Gianni Vattimo's analysis of his contemporary culture of visuality and simulation, we must think of the world as a `world of images of the world' [20:117]. Herein lies certainly something of the theoretical and artistic liberation which the post-photography critics could rightly emphasize!

In sum, one can say about digitalization as experience that the "Image" seems further liberated from the vulgar repres-entational thinking, whereby the photograph is conceived of as a kind of simple continuous and amorphous analogical depiction of a specific chunk of reality. After digitalization, photography has created a kind *of double reflexivity* in relation to the world; a reflexivity which has contributed to a general "discretization" of the photographic image, i.e., that in a semiotic sense, the image object can then be conceived as an assemblage of discrete units dependent upon the image's iconic and indexical thematicization. This question, as we know, has afflicted semiotics beginning with Barthes, who in several instances insisted on the fundamental "codelessness" of the photograph [1:51ff], observing that the "meaning" of the image could be justified only by the fact that as *analogon*, it "transmitted" a world of meaning (*un monde du sens*, as Christian Metz had it). That the codeless dimension in the photograph was not continuously analogic but, rather, "punctuated" seems also to be evident to Barthes himself in his later texts on photography, cf. the concept *punctum* [2].

In the following, I will attempt to take "one step forward" (or, rather, a genealogical step backwards) by showing how this double reflexivity can be conceptually incorporated into a radically realistic relationship between reality and image. This post-photographic critique, I argue, seems to offer no basis for abandoning the idea of an indexical dimension in the photograph.

On the contrary, it is possible to reassess this indexicality in a far more radical way than previously and hereby liberate it further from the ideological phantasms which, according to the post-photography critique, are linked to the so-called chemical photography; phantasms which must primarily be found in the crude analogical perception of representation. As a point of departure, I will incorporate Pasolini's realistic film theory and emphasize the temporal aspects which I also find especially relevant for understanding the iconic re-thematicization after digitalization.

4. PASOLINI AND THE DEATH OF THE IMAGE

One of Deleuze's important—and overlooked—points of departure in his work with cinema as a way of conceiving the world in broader terms was Pier Paolo Pasolini's contribution to film theory [7:28]. Pasolini's own fate has become something of a morbid paradox in relation to the theses he himself developed. Although this Italian film director, poet, critic, and activist has long been dead and buried, one can nevertheless say that Pasolini lives; that he lives onward, not only by virtue of his corpus of films, poetry and essays; but also—regrettably—as a "corpus" in more literal sense. As is well known, Pasolini's remains were exhumed a few years ago in connection with an investigation into the tragic circumstances of his murder; an interest which had sown doubts around the original murder case, in which the original accused was a male prostitute; but which subsequently led to a reopened investigation by the Italian police. The paradox of this situation consists of the fact that Pasolini himself regarded death as that event which gave human life its full significance. In one of his heretical contributions to his contemporaneous film theory environment, the film semiotics of the late 1960s,[3] he writes that

> Man ... expresses himself primarily by his action ... because it is with it that he modifies reality and engraves it on the soul. But this action lacks unity, that is, meaning, *until it has been completed* .... In a word, so long as he has a future, that is, an unknown quantity, man is unexpressed. There may be an honest man who, at sixty years of age, commits a crime; such a blameworthy action modifies all his past actions, and therefore he appears as something different from what he had always been [15:236]

Of course, this problem will be known to the biographers who venture to write the "story" of a person before his or her death (or even before the completion of the person's "life's work" or professional career). As Pasolini writes: "Until I die, no one can guarantee to really know me, that is, to be able to give a meaning to my action, which therefore, as a linguistic moment, can be deciphered only with difficulty" (ibid.). We have here an absolutely final significance on the basis of an absolutely finalized life course.

> It is therefore absolutely necessary to die, *because, as long as we live, we have no meaning*, and the language of our lives (with which we express ourselves, and to which we therefore attribute the greatest importance) is untranslatable; a chaos of possibilities, a search for relations and meanings without resolution. *Death effects an instantaneous montage of our lives* [Pasolini 15:236].

Using a cinematic metaphor hardly fortuitously chosen, he observes that

> death chooses the truly meaningful moments (which are no longer modifiable by other possible, contrary or incoherent moments) and puts them in a sequence, transforming an infinite, unstable, and uncertain—and therefore, linguistically not describable—present into a clear, stable, certain, and therefore easily describable past. *It is only thanks to death that our life serves to express ourselves*. [15:236-237].

When we consider Pasolini's own fate *post mortem*, however, we must inevitably inquire whether death is really necessary for the meaning of life, i.e., life as completed story, or whether it is precisely the opposite: that life as a story in itself "contains" a death in order to be meaningful. Biographers who embark upon a description of living persons may for their part well imagine these persons as already being deceased in order to be at all able to tell the story of the person straight away in simple past tense; they may, as the journalists say, have "seen the story" even before it is told. Only by the fact that Pasolini "lives", that he "lives" onward (as corpse), are we led to the morbid state of affairs that precisely this person has succeeded in escaping or "surviving" the biographers' story-telling; this despite the fact that it was indeed this very Pasolini who described the function of death precisely as giver of meaning. Although unceasingly lending himself to story-tellings, historiographies, Pasolini lives onward as a "chaos of possibilities".

In this sense, Pasolini appears emblematic of the open, "uncut" film image, the camera shot, which as Catherine Russell writes, is characteristic of the "new cinemas" after the Second World War: i.e., the French New Wave, New American Cinema, etc. Pasolini describes the relationships between the "futureness" of the open, reality-oriented film shots and the "pastness" of the closed "cut" as it enters into the cinematic story.[4] He defends the

[3] Pasolini's film theoretical work made its entry onto the film semiological scene which dominated at that time. Today, however, his fundamental problems are not especially related to those of film semiotics, and Pasolini's theses, the terminology of which explicitly addressed semiotics, has also been subjected to significant critique from semiotics proper, among others by Umberto Eco, who considered his realism to be naive. In retrospect, one can say that it was a case of a "mutual misunderstanding" of the fact that Pasolini should be a film semiotician, that is at least in the strict semiological sense.

[4] "To cut" a film entails "cutting out" something, while "montage" means to add on. When "cutting" occurs, one edits out what is left over in relation to the general principle of the "story", i.e. *diegesis* (as if the story of the film was given in

film shot's realistic and materialistic ontology whose justification derives from the diegetic film's articulatory basic elements in metafictional sense being conceived as infinite in duration and as the material documentation of what in principle is just one out of an infinite amount of possible camera points-of-view in relation to the referential—or to be more precise, film-producing-reality. In order to illustrate this idea, Pasolini refers to the amateur film accidentally taken during the assassination of John F. Kennedy in 1963, the "Zapruder film" (named after the man who made it, Abraham Zapruder), and which subsequently constituted principal documentation in the investigation of the Kennedy assassination.

> Let us look at the 16-mm short that a spectator in the crowd filmed of the death of Kennedy. It is a sequence shot, and it is the most typical sequence shot possible. The spectator-cameraman, in fact, did not choose any visual angles; he simply filmed from where he was, framing what his eyes saw—better than the lens. Therefore the typical sequence shot is a "subjective".
>
> In the possible film on the death of Kennedy all the other visual angles are missing: from that of Kennedy himself, to that of Jacqueline, from that of the assassin who was shooting, to that of his accomplices... Supposing that we had some short films shot from all these visual angles, what would we have? A series of sequence shots which would reproduce the real things and actions of that hour, seen contemporaneously from various visual angles: seen, that is, through a series of "subjectives". The subjective is therefore the realistic boundary of every audiovisual technique [15:233].

The hypothetical reservoir of shots or "subjectives" will in principle unfold and be developed by the same present temporality as the referential; a "present participle", as it is called in grammar (a presence of internally integrated, "participating" instances, where the integration is constructed around the uncompleted actions): "This is just what is *happening*, while the camera is just *starting* to record": a happen-*ing* and a record-*ing*. As Pasolini has it, `reality speaks only with itself.' (15:234). In this conception, the film shot, the reality and the human life share from the outset common conditions of existence with reference to the possibility to "express itself completely" as Pasolini says. One can say that in relation to the story, in this case, the story of the murder of John F. Kennedy, Pasolini seems to argue for the existence of a "cinematographic ecology of meaning"; an ecology of possible open shots in the world; a kind of conceivable conditions of possibility for all images, in that the world and life in its infinity can be depicted in infinite cinematography, infinite "drawing of movement".

As could be expected, Pasolini considers this cinematographic ecology as something which in itself is meaningless or perhaps even meaning-emptying. Elaborating further on his example, he asks:

> In the very moment in which we, even for purely documentary reasons (for example, in a projection room of the police who are conducting an investigation), see all these subjective sequence shots one after the other, that is, we add them together even if not physically, what do we do? We make a sort of montage, albeit an extremely elementary one. And what do we obtain from this montage? We obtain a multiplication of "presents"; as if an action, instead of unfolding only once before our eyes, unfolded more times. This *multiplication of "presents"* in reality abolishes the present; it renders it useless, each of those presents postulating the relativity of the other, its unreliability, its lack of precision, its ambiguity. [15:233-4]

According to Pasolini, the analytical multiplication of shots from the same scene "abolishes" the present. The present tense of a set of juxtaposed shots is no longer the same as the present temporality of the referential, of "life" as a unique, uncompleted action; that is, the so-called presence of internally integrated and mutually "participating" instances, hence the notion of a present participle. When juxtaposed analytically, each shot is only "postulating a relativity"; it is a kind of present tense that awaits not the completion of a referential action but the completion of the material in some other sense, as if by some cognitive instance that may "see the story" in the apparent meaninglessness of the mix of shots. The alternative to the simple juxtaposition of subjectives is "coordination", that is montage. Pasolini's film metaphors in the thesis of "death as the instantaneous montage of life", as mentioned, were hardly coincidental. In Pasolini's conception, the montage is a "coordinating" instance which "sees the story" in reality and in its shedding off cinematographic images, like a snake shedding its skin:

> Their coordination in fact is not limited, like juxtaposition, to destroying and rendering vain the concept of the present (as in the hypothetical projection of the various shorts, screened one after the other in the projection room of the FBI), *but to render the present past* .
>
> ... After this work of choice and coordination, the various visual angles would be dissolved, and the existential subjectivity would give way to objectivity; there would no longer be the pitiful pairs of eyes-ears (or camera-recorders) to capture and reproduce the escaping and so scarcely cordial reality, but in their place there would be a narrator. This narrator transforms the present into past [15:235].

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advance as a kind of transcendental content "before" the actual editing of the film). Montage, in contrast, means that the story is constructed from individual elements. As a syntagme, a "cut" must thus be defined as a purely diegetic element; while a "shot" denotes the smallest element of the montage (from cut to cut). One can say that the terms "cutting" and "montage" in this sense denote, respectively, a "top-down" and "bottom-up" idea in terms of technically and cognitively producing a work of film.

In this theoretical idea, being able to "see the story" entails being able to see the actions, the events and the life as completed movements, possibly before they have found a material or technical conclusion in themselves; it entails having written an obituary before death takes place. In Pasolini's perception, the brilliant intentionality of montage is subdued and absolutely authoritative, operating as it does without allowing an individual shot to last longer than what is justified by the narrative causal logic and by the experience of the story. In film studies, there is a tradition for identifying this form of montage with what is historically the most widespread system of representation, "analytical, dramatic montage" (Bazin) or simple "classic Hollywood montage", as modern film theory has it. It is a montage which analyzes the drama and its space in relation to a strict narrative economy.

5. THE GRAMMATICAL TENSES OF THE IMAGE

What we are left with after Pasolini is a radically realistic notion of the relationship between reality and image, and a significantly more sophisticated concept of the indexical themes in temporal sense. We are familiar with Barthes' [2] apparently simple identification of the temporality of the indexical or chemical myth in the photograph: "That-has-been": that which is there, in the photograph, has in fact once been.

> For the *noeme*: "That-has-been" was possible only on the day when a scientific circumstance (the discovery that silver halogens were sensitive to light) made it possible to recover and print directly the luminous rays emitted by a variously lighted object. The photograph is literally an emanation of the referent. [2:80]

In relation to this "frozen" perfect tense of "that-has-been" in Barthes, we find in Pasolini a coexisting complexity of tenses; first a "participating" present tense of "living" and "cinematographic recording", a present participle: a "being-living for recording" in a cinematographic world, that is in relation to the stories of Life and its actions. The result of the coordinating instance of montage is designated by Pasolini as "historical present": a "cinematic understanding" of Barthes' present-perfect in the photograph. For can one not say about the diegetic film both "Once upon a time" (i.e., simple past) as in all other diegetic forms, *and* "This is happening"? This is taking place right now in a present tense form up there on the screen: Pasolini's notion of a past tense in the cinema is 'A past that, for reasons immanent in the cinematographic medium, and not because of an aesthetic choice, always has the qualities of the present (*it is, in other words a historical present*).' [15: 236]

In a sense one is again finding in the film theatre the same participatory present tense of the so-called "pre-filmic" life, that is, the present participle. However, the present temporality being discussed here is perhaps certainly as much a film shot's fleeting "disappearing time" in relation to the establishment of the experience of history as the time of that which is "taking place up there" on the screen. For in relation to the montage and diegesis, the shot has either always already disappeared or is disappearing in the experience of the story, depending on which temporal perspective is applied. Christian Metz, in his attempt to establish a semiotics of film, observes that `The rule of the "story" [*histoire*] is so powerful that the image, which is said to be the major constituent of the film [*cinéma*], vanishes behind the plot it has woven ... so that the cinema is only in theory the art of images' [13:45, original French terms added]. Metz thus argues that the image, the film shot, does not actually "exist" in the experience of a film: 'To go from one image to two images is to go from image to language' [13:53]. On this actually metaphysical foundation, Metz ends by defining the film object as `the object which is perceived by the spectator during the show' [14]. The "film" is then defined ontologically as object in the experience of, not shots and montage, but of diegesis, of story: "Once upon a time". According to Metz' reductionist approach to cinematic ontology, it is only in "theory that film is a pictorial art". However, it must then precisely be on the basis of a theoretical and not empiricist or diegetic-historicist point of view that Pasolini's special (historical) present-temporality must be identified. A deconstructive reading of Metz will end with the film shot manifesting itself as a punctual "appearance-disappearance": that the film shot exclusively comes forward in order to disappear in the experience of diegesis [10:49ff], and that this situation implies a punctual realization of the spectator as subject.[5] Presenttenseness in Pasolini's concept of the cinematic "historical present" may thus be termed as a "disappearing" or better: a "It's-just-about-to-disappear", i.e., a kind of punctual "before" of the present participle. It is a "participating" present tense form, not in relation between the world and cinematography but between cinematography and story.

We nevertheless find a double, coexisting temporality a la Pasolini in Barthes. As Danish art theorist Rune Gade observes, one can say that

> the photograph's having-been-there indicates correctly enough past tense, but this past-temporality is complicated by the photograph appearing (embalmed) in its own arrested present... Phenomenologically, this special past tense form has consequences for the experience of the photograph because in this tense it always inevitably becomes an "inviting sign of my future death." [2:118] This is the element in the photograph which Barthes calls catastrophic because allowing the two tenses to collide and coexist (in a futureperfect) ultimately also destroys time; "it is dead and it must die" [2:117], goes the certain, melancholy proposition about time with which every historical photograph confronts us, and which thereby also indirectly pronounces a verdict over each and every individual's life, prophesizing everyone's death. [9:44-45, my translation, references adjusted to the English edition].

[5] In employing the Lacanian conceptual apparatus, I [11] have attempted to show how this temporality can be derived from a hedonistic radical empiricism on the background of a reading of Barthes' essay "Leaving the Movie Theatre" [3].

This disastrous future-perfect is perhaps even further complicated. Barthes points out the situation most clearly when he refers to a Winnicott patient "shuddering over a catastrophe which has already occured" [2:96]; i.e., a traumatic past linked up to a disastrous future. Maurice Blanchot—again referring to Winnicott—has described this temporality especially well in *The Writing of the Disaster* (1986). 'We are on the edge of disaster without being able to situate it in the future: it is rather always already past, and yet we are on the edge or under the threat, all formulations which would imply the future—that which is yet to come' [6:1].

This *past future*, if you will, seems to imply a kind of "traumatic realism", complicating our effort to distinguish the other temporalities from psychological character types and experiential categories as we might find them in typical literary genres. Is the tense of melancholy and melodrama not present-perfect or future-perfect? Is the tense of the paranoia and the thriller not referred to in the punctual "before present-participle"? *"It-is just-about-to-happen"* (hence the punctual suspense of the image frame in the thriller, constantly to be transgressed by the evil intruder). Without venturing further on this point here, I wish simply to observe that the grammatical tenses of the image are irrevocably connected to the temporality of the subject and of the narrative genres. However, I can conclude that the "Image", with its complexity of tenses, apparently lends itself to very different temporal contexts and possibly assumes a genealogical function in relation to narration and subjects.[6]

Jacques Derrida, in his analysis of Barthes' Camera Lucida [2], 'Les morts de Roland Barthes', touches upon Barthes' invocation of "Death" or the "trauma", as the photography book's unique, past and future axes greatly allow themselves to be problematized [8]. Hence the article's title, with the impossible "deaths" in the plural. The paradoxical aspect of the *punctum* concept, according to Derrida, is that in spite of, or perhaps precisely because of, its uniqueness, it redoubles itself in infinite, metonymic relations: there is one single "Death" and there is one single "trauma", but there is always one more image in Barthes' endless series of investigated photographs in *Camera Lucida*:

> As the place of the irreplaceable singularity [i.e., the loss of the mother] and the unique referential [i.e., the loss of the referent by its unique detail], the punctum irradiates and, what is most surprising, lends itself to metonymy. As soon as it allows itself to be drawn into a system of substitutions, it can evade everything, objects as well as effects. This singularity which is nowhere *in* the field mobilizes everything everywhere; it pluralizes itself. If the photograph bespeaks the unique death, the death of the unique, this death repeats itself immediately, as such, and is itself everywhere [8:285, my inserts].

"Death", the unique death or the death of the unique, is for Derrida thus dissolved as genealogical instance for the punctum's metonymic effect. We are left with time itself:

> For is not Time the ultimate resource for the substitution of one absolute instance by another, for the replacement of the irreplaceable, the replacement of this unique referent by another which is yet another instant, completely other and yet the same? Is not Time the form and punctual force of all *metonymy in its last instance*? [8:288].

Time is inserted here as genealogical justification for the *punctum*'s metonymic breeding power. Time is thus regarded as a more primary instance than the "Photograph" as concerns the ontological status that Barthes attributes to this concept. But is the "Image" which appears as a theoretical possibility after the realistic photo theory precisely not inseparable from a concept of time as in any case grammatically complex or multidimensional size? Yet, this only appears to be the experience of the analysis of the so-called chemical photograph.

6. THE DIAGRAMMATIC IMAGE

With the digital or post-photographic image, the indexical myth is integrated with the iconic as common ground for the thematicization of the image's relationship to its referential world. This means that an extra dimension is added to the given context, that is the indexical complexity of tenses. One of the most canonized and thankful examples of post-photographic art is that of the American photographer (or rather then, pictorial artist) Nancy Burson's *oeuvre* of photo "composites", that is, images based on a simple morphing technique and a common concept of "amalgamating" referents on the basis of a specific idea. In *Warhead I* (1982) the faces of political leaders, i.e. "heads of states", from countries with nuclear weapons arsenals are "morphed" together such that the relative dominance of the individual facial expressions in the morphing are in direct proportion to the relative percentage of estimated number of warheads in the period 1982-85! The various "heads" of state—Reagan, Breshnev, Deng, Mitterand, and Thatcher—are all more or less recognizable in this picture, and the theme naturally reflects the Cold War era of the early 1980s. "Warhead I" is a digital photograph; hence, the indexical aspect is to a certain degree suspended in favor of an iconic, relational or proportional presentation of the facial expressions of the various Cold War leaders. The indexical theme is still manifest, however, not in the form of the (iconic) features of the individual heads of state (Breshnev's eyes, Reagan's nose, Thatcher's upper lip?) nor hardly in the form of their individual relation to a photographic representation. Rather, the indexical theme is primarily given by an *internal relativity*, that is the proportional relationship between the facial features; a proportional relativity expressed and thus indeed explicitly thematized in actual percentages. This form of indexically mediated iconicity is reminiscent of Peirce's concept of the diagram; an iconic sign relation where the sign relates to its object in terms of similarity pertaining to a relativity in the object. Whereas the metaphor is symbolically mediated and the image (or hypo-icon) is iconically mediated iconicity, the diagram is mediated indexically; it is a form of indexicality which possesses a higher degree of abstraction than the simple

[6] I would still assert that such a temporal genealogical function in the "image" makes possible a partially aesthetic justification of psychoanalysis with reference to, for example, its theory of the fundamental character types.

referential indexicality of the "classical" chemical photograph; an abstraction which has come about by virtue of digitalization's integration of the iconic theme in the photograph's founding mythology as a medium. As a true post-photographic image, Burson's "Warhead" composite thus demonstrates that photographic representation no longer "adheres" to the referential world, and that the indexical theme is integrated in a more abstract way than in the chemical photograph. Burson's point is that the proportionality of warheads among states with nuclear arms is a particularly pertinent object of study for the pictorial artist using digital photography as a medium; pertinent because this medium is particularly suited for representing relations and proportions.

Does this formalistic analysis exhaust the entire meaning content in this naturally strict conceptualist image? Of course not! The playing with facial expressions in percentage ratios refers to a theme which lies outside the diagrammatic of the image, i.e., the Cold War period with the well-grounded and widespread fear of first strike attack with atomic weapons from east or west. On the basis of this image-external theme, the composite "Warhead" figure appears, rather, as the threatening "warhead" in a phantasmagoric presentation of pure evil in the form of atomic weapons-based aggression. This ghostly warhead seems to pop up out of nowhere; it is not even indexically mediated as in traditional photographs, and thus seems to be able to relate itself in an almost unmediated way to the picture's usual limitation: the frame and the image surface. The warhead figure, as a result of the suspension of primary indexical mediation, is a sublime object in a paranoid, indeed future-temporal imaginary world. This peculiar presence is markedly different from what is traditionally associated with the photograph. Even though the figure lies there in the image, it is not there yet; but it awaits us as a possible future disaster. Peirce observed that the diagram—like mathematical equations which can be reformulated and solved—has a being-in-future, an *esse in futurum* [16]. Is it not precisely the diagrammatic, i.e., the indexically mediated iconicity which invokes this ghost-like future temporality? The chemical photograph was primarily the image of the past (but also the future of the past); the digital photograph is of the future only insofar as the thematic of the primary, indexical photograph is suspended. The "Image", the photographic image after digitalization, seems to "contain" all possible tenses and in terms of Derrida's analysis is inseparable from Time as such. On this background, we can conclude that the Image is dead! And even twice dead: first by the chemical and the digital photograph's instituting of an artistic and theoretical reflexivity in relation to the world and second in relation to art. Long live the Image! After "chemicalization" and now digitalization, the image finally seems to be immortal.

7. ACKNOWLEDGMENTS

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Creative Flow Visualization Using A Physically Accurate Lighting Model

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ABSTRACT

A method is presented for creative visualization of three-dimensional turbulent flows in a two-dimensional image using a more compact representation of the flowfield and a photometrically accurate rendering step. Three-dimensional fluid flow is compactly represented as vortex lines or sheets, and a computational method called a vortex method, which is uniquely suited for this representation, is used to calculate the evolution of those elements in time and space. The positions of the vortex elements at any moment in time constitute a detailed three-dimensional form of the flow structure. To take advantage of the strengths of the human visual system and effectively convey meaning and understanding of this structure with an image, we used a renderer that handles physical light properties such as shadow and interreflection. The Radiance lighting simulation system, with its accurate and tunable interreflection lighting algorithm, was chosen to render the images. We believe that with this method, greater understanding of complex turbulent flows can be communicated, and more informative and captivating images can be created.

Keywords

rendering, visualization, fluid dynamics, vortex dynamics, turbulence.

1. INTRODUCTION

From before birth, we familiarize ourselves with the indirect effects of fluid motion. We wade in an invisible sea of air and sense its pull on our clothes, our hair, and our car. We gain glimpses of its hidden motions when we pour milk into water, or watch a cloud form or smoke rise. We rarely truly see its internal motions, though, because the fluid we observe is either transparent, and thus its motions are invisible, or it is opaque and we are unable to see inside of it.

Purposefully injecting smoke or other particles into a flow in order to more closely observe it is probably the oldest, and is still a valid, method for physical visualization of flows. Unless a sequence of images is made, though, no velocity information can be gained, and particulate density information is all that remains.

Computer simulation, though, offers us a window through which to see and gain understanding of flows of all kinds.

Because computers calculate and store all of the information pertaining to a flow, we are able to analyze any aspect of it, choosing from any number of visualization methods.

The first real advances in two-dimensional flow visualization, beyond grid arrows and individual streamlines, stemmed from the creation of spot noise textures [21] and its successor, the line integral convolution (LIC) method [4]. LIC has since been improved [17, 22] and applied to pseudo-3D flows [16], as 2D textures on 3D objects [15], and as a three-dimensional texture [4, 7]. The effectiveness of LIC is due, in part, to the obvious similarity with 2D illuminated particle visualization.

To display more data than simply velocity, LIC can be combined with multiple layers of layers of glyphs [8] or data-driven spots [18], each representing other flow variables such as strain, vorticity, or turbulence intensity. These methods often create confusing images because they are cluttered with too many icons and colors that individually may have little intuitive meaning. However, to a trained observer, they are able to communicate large amounts of information, including complex relations between variables.

The primary problems with flow visualization in three dimensions are the occlusion of data behind other data and the lack of directional and depth hints. One solution is to allow interactive manipulation of the three-dimensional dataset, allowing the user to view occluded regions or details by rotating them into view or bringing them closer to the virtual viewpoint. Another solution is to define a reduced set of glyphs or markers that can similarly represent the complex fluid flow pattern. This

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avoids the problem, common in large flow datasets, of visually overlapping geometry. Methods to extract volumes of high vorticity [25], individual vortex lines [24], or tubes [1] from velocity field datasets have met with some success. Other methods aim to reduce the large amount of data by extracting salient features from streamlines in the velocity field [19], or by finding topological critical points and regions in 3D velocity data [2, 6].

In this paper, we assemble a visualization method that allows us to look at a three-dimensional turbulent flow by representing it as parcels of rotating fluid, each rendered as a solid object.

Even this representation can become visually confusing, so to enhance understanding, we turned to proven visual cues such as lighting, shadow, and interreflection. Recent research in vision and perception indicates that accounting for these illumination components during rendering leads to more effective communication of 3D shape. New methods and techniques in computer graphics can recreate these effects, and are thus able to create more realistic images of 3D objects than have been possible before.

Regardless of the technique used for flow visualization, the source material—the flow itself—is characterized by forms and motions that are universal to fluid flow, and are at times both consciously and unconsciously familiar. A by-product of this universality is that these images speak a common language to all observers. We seek to use this language to create insight and appreciation for the invisible and complex motions of turbulence, and to possibly communicate more than the sum of its parts.

2. FLUID DYNAMICS

2.1 Governing Equations

The modern era of fluid dynamics arguably began in the first half of the nineteenth century when Claude Navier and George Stokes first wrote the equations that now bear their names. The Navier-Stokes equations, the fluid equivalent of Newton's $F = m\boldsymbol{a}$, define the three components of fluid vector acceleration $\delta\boldsymbol{u}/\delta t$ in terms of the vector-valued velocity $\boldsymbol{u}$ and gravity $\boldsymbol{g}$ and the scalar pressure p, density ρ, and coefficient of kinematic viscosity ν. Together with the constraint equation for conservation of mass (1), the vector form of these equations constitutes a good starting point for the study of incompressible fluid dynamics.

$$\nabla \cdot \boldsymbol{u} = 0 \qquad (1)$$

$$\frac{\partial \boldsymbol{u}}{\partial t} + \boldsymbol{u} \cdot \nabla \boldsymbol{u} = \boldsymbol{g} - \frac{1}{\rho}\nabla p + \nu \nabla^2 \boldsymbol{u} \qquad (2)$$

The last term in (2) is an approximation of the friction forces present in the flow, and scales in magnitude with the velocity and the coefficient of viscosity ν. When this term dominates the equation, as is the case with flow at very small scales or in fluids with high viscosity such as molasses, the flow is said to be laminar. Laminar flows are typically smooth and non-fluctuating. In contrast, when the friction term is small enough that inertia no longer succumbs to the stabilizing effects of viscosity, the flow's motions change drastically and the flow becomes turbulent. A turbulent flow is characterized by large and rapid velocity fluctuations of a seemingly random nature. Both laminar and turbulent flow can be observed in Fig. 1 [20].

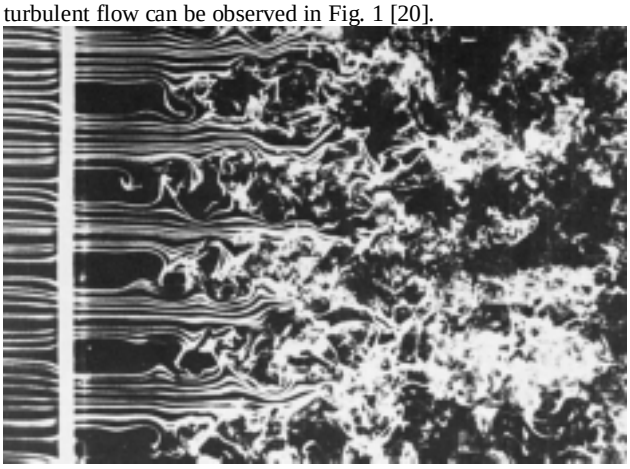

Figure 1: Smoke visualization of uniform laminar stream owing through a perforated plate, showing laminar, transitional, and turbulent flow, photograph by Thomas Corke and Hassan Nagib.

To date, exact solutions of the Navier-Stokes equations exist for about 80 particular cases, most of them for laminar flow in special geometries.

2.2 Computational Fluid Dynamics

Modern fluid dynamics research deals very frequently with turbulent flows and other flows with complex unsteady motions for which analytic solutions do not exist. Computational fluid dynamics (CFD) provides a way to calculate an approximate solution to the Navier-Stokes, or any similar fluid dynamic equation set, for a wide variety of flow regimes or boundary condition. CFD works by breaking one large complicated problem into a very large number of much smaller and simpler interrelated problems and concurrently solving them on a computer.

There are two major types of CFD formulations: Eulerian, in which flow properties are computed and stored on a fixed grid, and Lagrangian, in which flow properties are tied to particles that move about in a gridless domain. An extensive body of literature is available for each of these formulations, and each has advantages and disadvantages.

Eulerian methods have dominated industrial CFD and thus created a need for visualization tools that can efficiently deal with large volumes of grid data. Current visualization methods for large field datasets either must employ high data throughput rates or rely on data reduction to emphasize meaningful features.

Lagrangian methods, being a more natural way to represent a physical system, usually incorporate computational elements that, by definition, represent important features of the system such as discrete packets of fluid, fluid interfaces, or solid particles. Computation time is thus not wasted in areas where nothing interesting is occurring. Often, though, a greater density of

Lagrangian particles is required to maintain simulation accuracy than would be required for an equivalent Eulerian method.

A Lagrangian vortex method was used to create the datasets from which images appearing in this paper are rendered.

More details of this method appear in section 2.4.

2.3 Vorticity

Flow properties typically include velocity, density, pressure, temperature, or scalar fraction, though many other properties can be computed from this basic set. Depending on the problem at hand, an alternate property, called vorticity, can be far more informative than those listed above.

Vorticity is the curl of the velocity ($\omega = \nabla x \boldsymbol{u}$) and is a vector quantity which points along the axis of fluid rotation and has a magnitude proportional to the rate of rotation of the fluid around that axis. Vorticity is most often created when fluid is in moving contact with a solid boundary, though it can be created in other special situations. Additionally, it can be shown that knowing the vorticity field and boundary conditions of a flow is equivalent to knowing the velocity field.

In this paper, because we deal primarily with incompressible, constant-temperature, single-phase turbulent flows, we can make several simplifications to the equations of motion, not the least of which is that we can rewrite the Navier-Stokes relations in terms of the vorticity. Taking the curl of the Navier-Stokes equation gives the vorticity transport equation.

$$\frac{\partial \boldsymbol{\omega}}{\partial t} + \boldsymbol{u} \cdot \nabla \boldsymbol{\omega} = \boldsymbol{\omega} \cdot \nabla \boldsymbol{u} + \nu \nabla^2 \boldsymbol{\omega} \qquad (3)$$

One of the benefits of this formulation is the absence of the pressure term. The equation is now only dependent on vorticity and velocity. This greatly simplifies some numerical methods designed to solve the Navier-Stokes equations.

In flows with minimal viscous diffusion, another advantage of the vorticity formulation manifests. In these flows, the volume of fluid with significant vorticity magnitude is typically a small fraction of the total flow volume. This means that the flow can be represented in a more compact form by vorticity than is possible with velocity. This fact lends support to computational methods in vorticity variables. This compactness is surprisingly illustrated in the results of Banks and Singer [1]. They achieved compression ratios of up to 4000:1 by representing a turbulent flow field with vortex tubes, though no tests were performed to compare the reconstructed velocity field to the original velocity field.

A disadvantage of using vorticity to represent flow fields is that, without animation of the flow or appropriate training, vortex lines themselves give no indication of flow velocity.

This could be because visual representations of fluid vorticity itself are far less common in nature than those of velocity. Fortunately, because vortex lines flow with the velocity field, we are still able to perceive fluid-like shapes and motions in the vorticity field.

2.4 Vortex Methods

A vortex method is a computational method in which the flow is represented by a collection of Lagrangian particles of vorticity moving under the self-influence of one another. This motion is quantified by the Biot-Savart law (4), which determines the velocity at a point in space given a complete definition of the vorticity field.

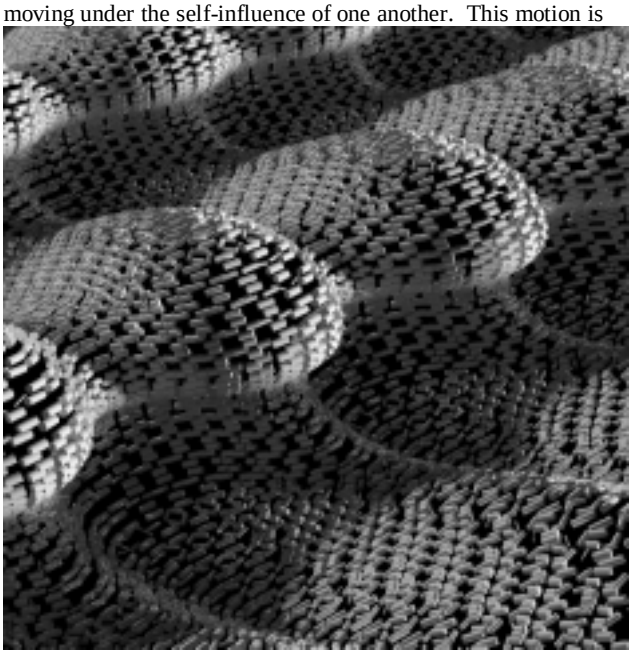

Figure 2: Development of three-dimensional shear layer instability, the element vorticity is represented by cylinder volume and direction; image rendered with global illumination calculation

$$\boldsymbol{u}(\boldsymbol{x}, t) = \frac{1}{4\pi} \int \frac{\boldsymbol{\omega}(\boldsymbol{x}', t) \times (\boldsymbol{x} - \boldsymbol{x}')}{|\boldsymbol{x} - \boldsymbol{x}'|^3} \, d\boldsymbol{x}' \qquad (4)$$

Using this formula, a vortex particle's velocity can be computed from the vorticity and location of every other particle. Each particle is then advected according to its local velocity, and has its vorticity modified to account for vortex stretching and viscous effects. Fig. 2 shows a deforming shear layer defined by vortex particles of various strengths and directions.

It is obvious that if the Biot-Savart law were used to calculate the velocity of each of the N particles in a simulation, then the calculation of a single time step would involve $O(N^2)$ evaluations. This is clearly inappropriate for large values of N, as would be necessary for simulations of three-dimensional turbulence. The simulation results presented here were performed with a Vortex-In-Cell (VIC) method, which uses a temporary grid to solve for the velocity field instead of evaluating the Biot-Savart kernel for every vortex element pair.

The discretization and remeshing routines are unique to this method, and govern the final shape of the rendered geometries. The simulation starts with a single vortex ring or other similar closed vortex loop, defined as a series of nodes connected

together with elements. The vorticity is represented as circulations on the edges of triangular elements. The resulting vortex line, through the VIC method, defines a specific velocity field. That velocity field is then used to advect the nodes that make up the line, changing the geometry of the line. When the distance

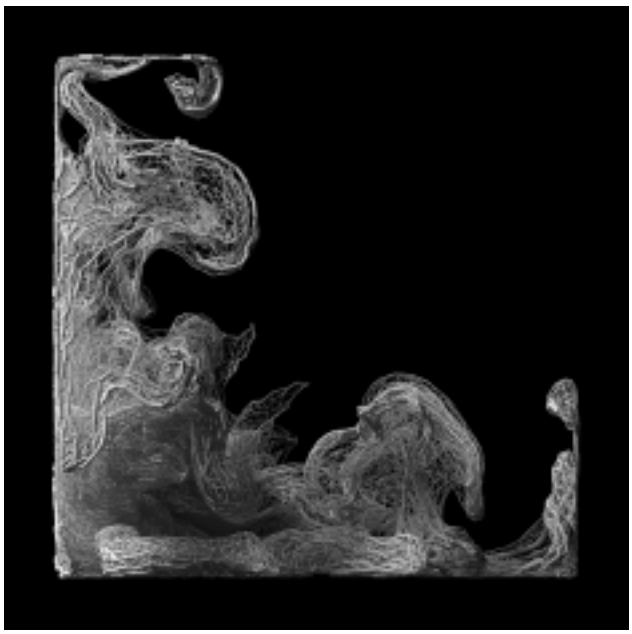

Figure 3: Rendering of a collection of vortex segments from a wholly contrived flow inside of a cube, with global illumination calculation. Note the illusion of depth despite the lack of perspective.

between two nodes exceeds a preset threshold, a new node is inserted between the two. Likewise, when two nodes approach to within a set distance, they are merged into one node. The objects rendered in this work are the result of this constant stretching and refining of the initial vortex line.

More complete descriptions of this and other types of vortex methods are available in the literature [11, 5].

3. VISUALIZATION

Richard W. Hamming, mathematician and computer scientist, best emphasized the need for good data visualization when he penned the following phrase:

> The purpose of computation is insight, not numbers.

Rendering, in some manner, is a requirement for visualization of three-dimensional data. The rendering method can be as simple as an isometric line drawing, as complex as a costly separate calculation to realistically simulate the behavior of light in a scene, or any combination of methods in between. Fig. 3 illustrates a mix of methods: an unrealistic parallel view projection is used with a realistic interreflection calculation in the rendering step. It is important that the final choice of rendering method support, and not detract from, the message to be visually conveyed.

Additionally, effective visualization relies on choosing the data that most succinctly communicate the desired message. For the same reasons that a vortex method was chosen to simulate the flow, so shall vorticity be chosen as the primary data variable.

3.1 Direct Lighting and Shadow

There are essentially three components of illumination on any object; the first is classical—or direct—shading, which depends on the angle and distance between the surface and the illumination. The second is that of shadowing, which depends on the visibility of the light source from the surface patch. Lastly, surface interreflections account for the specular and diffuse reflections of incoming light on a surface. The first two of these components are related, as collimated light from direct sources not only accounts for classical shading, its occlusion is what creates a shadow. Interreflection will be covered separately.

The most common method for simulating direct lighting and shadows is called raytracing. Any raytracing program will treat direct lighting and shadows properly, and thereby be able to portray a three-dimensional scene in a two-dimensional image. In order to effectively communicate the three-dimensional shape using visual cues in the image, though, the scene must conform to the human visual system's assumptions of lighting conditions, viewpoint, and object.

Experiments conducted to isolate human perceptual cues used in determining an object's shape from its shading have shown that not only does the human visual system use information from shadows to resolve ambiguities [3], but it makes prior assumptions, too. These assumptions are that the illumination is from above [13], the viewpoint is from above [14], and the shape itself is globally convex [10]. Most visualization programs that simulate direct lighting give control over these parameters.

Some visualization tools are designed to support only classical shading, thus ignoring many of the cues that our visual system relies on. The popularity of those tools, though, lies in their rendering speed. For example, the image in Fig. 4 was rendered using a general OpenGL triangle viewer at near-interactive rates, though it does not render shadows or interreflection.

3.2 Interreflection

Interreflection is the transport of light through a scene via successive specular and diffuse reflections off of surface patches.

It can manifest as a very subtle change in brightness or color in an image or it can change the character of an image substantially. It is also difficult to simulate computationally, often increasing rendering time by an order of magnitude or more.

Pure diffuse lighting, which is a simple way to mimic the effects of even interreflection, is shown to be just as effective an aid for distinguishing the local qualitative shape of surfaces as direct lighting and shadows combined [9]. A study by Madison [12] showed that interreflection and shadow could be equally important for human visual perception of spatial layout. A combination of both, in their experiment, was more effective than either individual method for communicating virtual object contact.

This importance of interreflection is easily demonstrated with the two images in Fig. 5. An identical scene was rendered twice, once without and once with interreflection. It is obvious that the

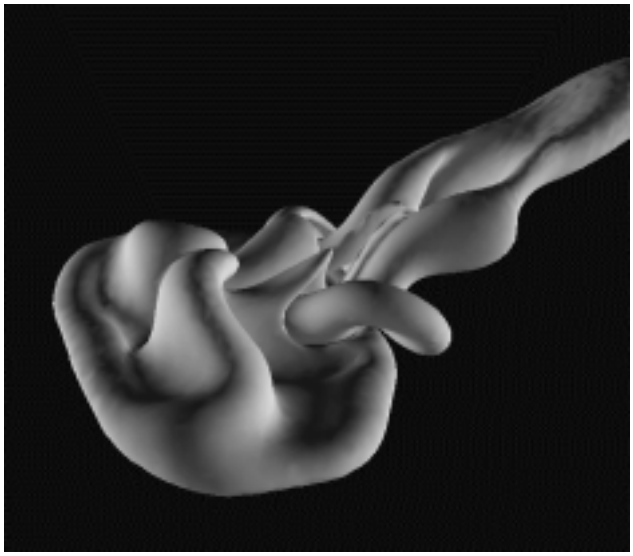

Figure 4: Advancing front of a buoyant jet, triangular elements rendered in OpenGL with direct lighting only

interreflection calculation adds significant visual depth to the image. It can even negate the loss of perspective, another valuable depth cue, illustrated in Fig. 3.

Interreflection can clearly enhance visual communication, though it has yet to gain wide acceptance. Most immersive media and data visualization techniques use only perspective and interactivity to communicate meaning.

3.3 Depth Cueing and Fog

In addition to the three primary components of scene illumination, there exist other methods to communicate depth or distance in a flat image. These are depth cueing and participating media.

Aerial perspective, sometimes called depth cueing, is the use of subtle changes in the color or intensity of light as it travels long distances through an atmosphere. Faraway objects take on more of the color of the horizon the closer they are to it. This is a commonly used trick borrowed from painting that can easily be incorporated into a computational method.

When fog is thick enough to scatter light away from its original direction, though, it begins to participate in the rendering calculation and is then referred to as participating media. This adds another depth-creating effect, as participating media is capable of giving visual volume to empty space itself. As light passes through a volume of fog, a certain amount scatters away from its original direction. Some of this light scatters toward the viewer, creating a sunbeam-like effect. These sunbeams not only signify a lack of solid structure within their volume, they hint at the shape of the opening that lets the light through. In Fig. 6, this effect is prominent enough to steal attention from the solid material in the scene. Fog is yet another visual cueing effect that manifests during realistic rendering.

Figure 5a: Late-stage development of a perturbed vortex ring, rendered without global illumination

Figure 5b: Late-stage development of a perturbed vortex ring, rendered with global illumination

3.4 Radiance

Realistic rendering, it seems, is the chief vehicle for communication of three-dimensional shape via a static two-dimensional image. With this as the criterion, Ward Larson's Radiance [23] was chosen for final visualization of most of the images appearing in this paper.

Figure 6: Repeating volume of periodic turbulence, rendered with fog and interreflection

Ward-Larson describes Radiance as a lighting simulation and rendering system. Radiance includes a photometrically accurate interreflection calculation algorithm and contains a large number and variety of modeling and analysis tools. Its renderer is capable of calculating all of the aforementioned components of illumination, all in scenes containing nearly any level of complexity. More accurate rendering calculations or larger scenes necessarily take longer to render, though Radiance tackles scenes impossible with other renderers. An example of the type of scene that Radiance excels at is shown in Fig. 7. The scene contains over one quarter million primitives and the ambient interreflection file contains 120 MB of information.

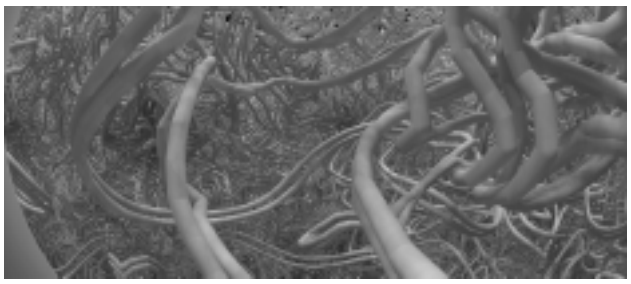

Figure 7: Vortex lines in fully developed turbulence, rendered with global illumination

Radiance versions 3.1 and 3.4 for UNIX were used for this work. Special compile options were used to allow very large ambient interreflection data files and to activate true Monte Carlo sampling. Images were rendered at two to four times presentation resolution and downsampled with a radial Gaussian filter. Additionally, some images were post-processed with a multi-step filter that mimics human visual response.

4. CONCLUSION

Though turbulent fluid flow is an extraordinarily common occurrence in daily life, its effective visualization remains elusive. One possible solution is to represent a complicated turbulent flow as a collection of connected vortexes, and to simulate its development with a computational method utilizing those vortex elements. In doing this, previously invisible structures are uncovered. The vortex lines, particles, and surfaces making up those structures are the most basic continuum fluid dynamic elements, and their organization is what defines the turbulent flow. When those elements are represented as solid objects, they form a mathematical sculpture of the turbulence, but one that would never be able to support itself as a physical structure.

Evidence supports the proposal that the best way to visualize a virtual object, for the purposes of communicating meaning, is to use a rendering method that most accurately simulates the true behavior of light in the scene. This simulation, by definition, will produce an image containing all of the same visual cues that real scenes possess, including light, shadow, interreflection, and depth cueing. Visualization software is now capable of computing all of these effects accurately, even for large scenes. This capability opens the doors for better data visualization, and for more creative and expressive visualization of things invisible or wholly impossible.

5. ACKNOWLEDGMENTS

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Interfacing Dance and Technology: Towards a Theoretical Framework for Dance in the Digital Domain

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ABSTRACT

Towards contributing to understand and organize the multiplicity of production within what can be identified as contemporary dance and technology, *dancetech*, I want to propose a theoretical framework rooted in the notion of *interface*. This framework aims at analyzing the work being produced by this emerging field integrating it in distinct but not mutually exclusive types of interface. *Dance-tech interfaces* are then perceived as the modes of experience and representation involved in the interaction between participants and elements constituting the works. Adapting representational modes to the intermedia realm, my approach to *dance-tech* is based in the experiential engagement between the participants (including the audience and the technological apparatus), and the concepts and practices concerning (the treatment of) different mediated languages, especially the body. This theoretical framework takes a critical standpoint in the exposure and fostering of alternatives to the perpetuation into the realm of digital technology of reductive and conservative ideas and practices about bodies and embodiments. Therefore, what I am interested in considering by *interface* is not only its physical and literal meaning but also how it is used to communicate the experiences and representations it generates.

Incorporating various theoretical perspectives and my own experience in the field, in the development of this typology of *dance-technology* as *interface* I have identified prominent tendencies in contemporary artistic collaborations. Perceived primarily as a mode of experience and interpretation used to produce the work's meaning to artists and audiences alike, I utilize the concept of *interface* on a methodological level, as a way to bridge the gap between practice and theory as I engage with dancing and writing alike. *Interface* allows a complex fluid approach between semiotics and phenomenology, entangling experience and representation in the involvement with the art works. Integrating late/tech semiotics and phenomenological aspects adopted by different authors such as Donna Haraway, and Amelia Jones, I perceive this approach as interconstitutive only dissociated by a surgical dissection. This semio-phenomenological analysis will then be applied to *Ghostcacthing* by Riverbed/Bill T. Jones, and *T-Garden* by Sponge/Foam as examples of distinct types of *dance-tech interfaces*.

Furthermore, the notion of *interface* enables the cross polinization and mutation of knowledge and practice domains in increasing extrapolations such as between arts, science, and technology. After a long period of painful Western disciplinary specialization and dichotomization, it's time to invest in convergences integrating artificially isolated knowledges and technologies into more inclusive and posthuman constructions. It is in this direction that I perceive recent tendencies in *dancetech* attempting to challenge art forms' boundaries and hierarchies, to raise bodies' agency, exalt neglected senses, and actively engage audiences. Clearly inherited from the 60's artistic breakthroughs, however, the context in question in this alternative pursue is that of an increasing digitalization of life which discourse and practices needs to be taken in consideration as we enter the new millennium. The challenge is pursued through experimentation intersecting and interconnecting bodies and technological systems. Multifaceted and multiformat modes of production and signification resulting from the fast development of, easier access to and decreasing cost of digital systems --though still limited to privileged groups of people-- as well as accumulation of experience, are giving rise to increasingly complex and sophisticated work which begs for critical analysis and discussion.

But rather than a linguistic oriented discourse, the *dancetech Interfaces* framework will enable to concentrate on ways through which dance partnering digital technology can enhance a synesthetic engagement of artists and audiences by demanding a reflexive interactive experience including kinesthesia and emotionality. Therefore, along with issues of visual representation (semiotics), which elicit a more passive and distanced interpretative response, my approach is also directed to the multisensorial experiences that *dancetech* work engages

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Germany

with. Finally, with this paper I want to call attention to how the overlapping aspects of dance and digital technologies can challenge the perception of ourselves and others, offering examples to experience and represent through emerging modes of communicating using multiple forms of mediation.

General Terms
Documentation, Performance, Design, Experimentation, Human Factors, Languages, Theory.

Keywords
Dancetech, Body-technology Interface, Semiotics Phenomenology, Kinesthesia, Synesthesia, Corporeality, Interdisciplinary Collaboration, Media Choreography, Gender and Ethnic Performativity, Visual Representation, Embodied Virtuality

1. PAPER
Ghostcatching is a virtual dance installation, involving dance, computer graphics[1] and drawing, produced by Riverbed[2] visual digital team including Paul Kaiser, Shelley Eshkar, and Michael Girard, in collaboration with dancer and choreographer Bill T. Jones.[3] The audience enters a large empty room in complete darkness encountering a life size animated hand-drawn human figure moving in a 3D virtual space. Even if I had already seen the piece as a video about a dozen times, I was glad to experience it as Riverbed intended. Instead of the distanced effect of watching it on an average size monitor, the void depiction of the virtual space blends with the darkness of the room enhancing the three-dimensional ghostliness of the characters and it gave me the sensation of sharing an imaginary space.[4] In what looks like a typical modern dance situation, a volatile hand-drawn character goes about a series of abstract poses confined by a semi-transparent box. Materializing out of this body as its own projections or flashes of imagination, further ghostly characters start emerging. First being re-absorbed and then continuing on their own, these figures appear and fade away one at the time in surprising ways, recurring, interrupting and juxtaposing each other. I'm able to distinguish them primarily for their contrasting vocabulary and quality of movement, characteristic, behavior stereotypes, specific dance forms, and Bill T. Jones' identifiable style. These bodies trace lines in space with their movement building a dense web that fills the space that achieves to entrap them. On top, it also obstructs our perception of the characters. Progressing in a non-linear fashion, the piece ends with a group of dancers (clones of the first) moving in unison with straight lines linking them together.

In contrast to *Ghostcatching*, another *dancetech* work, *TGarden* is a responsive play environment by two interdisciplinary collectives, Sponge and Foam[5], where the visitors are invited to become the very performers of the work, audience and performer merging into one. Prior to their entrance in the space, up to four participants are assisted to put on exquisite costumes, accelerometers and wearable computers. Already informed about the responsive nature of the environment, the participants explore the physical space through their costume, several large balloon-like balls scattered around, projected sound and images, and each other, trying to make sense of the experience as it happens. In an indirect ongoing response to how the "performers" move individually and collectively through time, the space responds visually and aurally, creating different climates as an actualization of the participants' movements and gestures.

Searching for ways to differentiate these and dance productions in general, where digital technologies play an important role, I want to emphasize how distinct the relationship/interface between the body and technology can be. *Ghostcatching*, for example, renders the live body as an amazing visual representation. Presented as an installation, this work challenges the concept of dance, confronting the audience with virtual dancers moving in a virtual space, which they are able to look at repeatedly and derive their own interpretation. The emphasis is on the creation of a visual aesthetic output where the live performer is replaced by a visual representation.[6] Although this visual representation resulted from Bill T. Jones interface with the motion capture technology, his role is secondary, taken as movement data to be further mapped and choreographed into the 'real' virtual protagonists by the digital artists towards the final 3D animated dance. [7]

On a different pole, *TGarden* challenges accepted models of social/bodily interaction for its aesthetic research design of media spaces that reflect upon the body-technology interface itself and the audience experience as constitutive of the artwork. Compared with *Ghostcathing's* visual representation, *TGarden's* approach to the body is purposefully not clearly defined. Its focus on systems that convert individual and collective movement into indirect sounds and images is intended to produce mutating audiovisual states. Here the "performers'" movements are continuously actualized in unusual mixing of recognizable instruments and synthetic soundscapes, and in magnified colored images such as of cells, nature, and textures, which are computer generated in real-time. Enacting the work's aesthetic orientation,

[1] Motion Capture and 3D Animation.

[2] Riverbed has recently become Kaiserworks. More information about *Ghostcatching* and other works by this team can be found at http://www.kaiserworks.com/duoframe/duoart.htm

[3] *Ghostcatching* premiered at the Houghton Gallery of Cooper Union, New York City, January 1999.

[4] Although this was no interactive virtual reality environment, the setting invited me as a spectator to kinesthetically empathize with the dancing figures.

[5] More information about both collectives and *TGarden* can be found at http://sponge.org and http://www.f0.am/tgarden

[6] The way the relation between the live and the virtual dancer is constructed, reveals the artists' concepts about the body and technology towards or resisting their intertwining.

the layers of media choreography performed by the computerized responses enables their specific real time modulation by the participants in their attempt to make sense of the experience. Indeed, as an attempt to adapt the technology to the body rather than molding the body to technology, *TGarden*'s research program has wearable computing as one of its key aspects.

1.1 Ghostcatching

As the *Ghostcatching* characters come off of one another, their subtle representation and the particular sequence of their appearance raises issues about gender, race and subject position. Interested in how the interfacing of body and movement with computer graphics contributes to theorizing gender and ethnicity visually in particular ways**,** I will focus on aspects of characters' hand drawn visual appearance,[7] their movement behavior[8] as well as the specific significance of their timed appearance. Although not too apparent, there are seven ghosts color-coded and with distinct repertoires. The first character inside the box is "the sculptor." Made of sketchy straight bluish lines like the box it performs abstract angular poses. As it goes from one pose to another in a slow monotone pace naming them with alphabetical letters: A B C, modern dance's analogy with written language, with its restrictive grammar of movement, comes to mind. Is this a metaphor for the disciplined universal body of modern western culture? While he loops the poses, the first of a series of ghosts[9] walks out of him mimicking the poses to rapidly be reabsorbed by the original. This was an exact copy, a clone. The second ghost is a different character. Its elegantly curved rosy lines and the delicate and undulating movements approach a female, or at least an effeminate subject, knowing Jones' gay identity and hearing his whispering voice. Before being also reabsorbed by the sculptor, 'she' graciously improvises between poses and alters their order partnering him. 'Her' tactical mocking performance seems a perfect example of iteration perpetuating and transgressing the norm represented by the poses. The patriarchal framework of western society is thus suggested, the sculptor representing the male universal out of which 'she' is the necessary deviation, the 'other', through which he defines himself but who also constitutes a thread to his authority. Or is this Jones' new way of dragging playing with the heterosexual norm?

The third character, "the soloist," leaps out of the sculptor making him disappear from site. This figure's body, attitude and movement approach not only a male but Jones himself. Blue lines delineate strong muscles and inclusively sketch out a penis[10]. His movements are ample and vigorous, enhanced by audible charcoal lines drawn by his hands and feet. He poses in long beautiful lines and continued with the ease and elegance of impulse and momentum while defining circles and arches. With this movement enhanced by the size of the figure this character conveys a vivid kinesthetic presence. Compared to the previous ghost, this fits the "breaking free" from strict modern dance forms in search for the looser embodiments within western dance.

Irrupting in space, a new character seems yet a further attempt to break free of conventions, maybe of western culture altogether. Not surprisingly, he is red. Made of very few lines. Screaming and then breathing loud, this character moves with chaotic energy, stomping on the ground, arms flexed, quickly filling the space with a web of red zigzagged lines reminding me of a monkey, or at least the stereotypical exoticized representation of indigenous behavior. (Figure 1) While this "indigenous man" wonders around, the effeminate character reappears calmly

Figure 1. *Ghostcatching's* 3D animated "indigenous" character and lines in space drawn by its movements

[7] Examples of visual aspects are the color and shape of the splines constituting their bodies.

[8] Examples of behaviors are angular or curved shapes, and fluid or rough dynamics.

[9] I must make reference to Jean Baudrillard's theory of simulation in his book *Simulations*, Semiotext[e], Columbia Univ.: NY, 1983. The 3 orders where the first is the copy of the real body, the second is a copy of the copy of the real, and the third is the production of the virtual independent from reality and where reality imitates the copy of itself. Applying this theory to the ghosts on *Ghostcatching*, the first order is represented by the sculptor, the second by the sculptors' clones, and the third by the other characters which seem to come out of the virtual space itself.

[10] I must refer to the story during the Q&A session of *Biped* 's demonstration before its premiere in Berkeley in 2000, where Paul Kaiser mentioned the interest in including the capture of Bill T. Jones' penis movement in response to my question about the possibility of working with a choreographer who's work different from Cunningham's neutrality would address gender. I'm surprised and curious to know why this capture was not pursued as this capture is suggested by one of the life size photos showing the motion capture process of creating the virtual body where the markers are visible.

singing her movement. The delicateness and elegance of her short composition is now clearly balletic for the pointed footwork, ronde-de-jambes-à-terre and pirouettes. A green ghost emerges from above, hanging and balancing its limbs and falls to the ground squatting. How to look at this movement if not by drawing more associations with orangutans and the like, in a Darwinist reminder of humans' 'naturalized' animalistic ancestry?

This excerpted description of the first characters in this piece is enough to show the tone I see the piece evolving as a mounting play between the main western male universal in crisis of identity, the romanticized feminine, and the animist primitive. This way the characters impersonate distinct even if subtle orientalist and gendered stereotypes, showing their construction in their movement and alternative visual appearance. Therefore, the soloist is the most recurrent character who increasingly integrates the other characters, representing the embodied assimilation of the 'other' gender and race. Once including a mix of balletic quick footwork of 'entrechat-quatres' and pirouettes en l'air, a sort of African chicken walk, and an inverted suspension. And then, turned multicolor (multicultural?) singing his movement as an intricate blend of his continuously evolving choreographic style. Is this character representing the western postmodern dance? Or the mixed cultured, gendered, and racialized body marked by his African American heritage? Lastly, seven clones of the sculptor moved mechanically together following the choreographer's directions. Are we back to the master discourse's primacy of the distanced mind, exerting its authority over the disciplined body?

Ghostcatching seems to convey at a liminal level Riverbed's struggles within a series of binaries one recognizes or associates with stereotypical constructions characteristic of the Enlightenment discourse -- feminine/masculine, primitive/civilized, natural/constructed. However, for the multiplicity of ghost characters materializing from a single abstracted figure, I am brought to consider it as a rather transgressive mixed gender, racial and cultural identity, as all of them are aspects of Bill T. Jones movement choreographed virtually by Riverbed. The piece then, at the same time, achieves to conform and to transgress the norm, on one hand representing the conventions in a very subtle but fashionable way. On the other hand, perceived as the imaginary abstraction of one real person performing all these roles, it challenges these very binaries. Therefore, although reducing the body to a visual representation, *Ghostcatching* reveals how movement through motion capture technology performs identity as a way through which gender and ethnicity can be actualized in cyberspace. In this context it achieves to exemplify Judith Butler's conception of gender (and race) as performance out of the written discourse into the very realm of virtual dance. Adapting her feminist argument to this domain, the movement of the *Ghostcatching's* characters, because derived from the performance of a unique and marked African-American subject as, Bill T. Jones, questioned and complicated the heterosexual basis of traditional western conventions in its biologically determined sex/gender (and race). [2], [3] and [5] Thus, represented by visual abstractions without always a clear gender or ethnicity, the movement provides another type of visual construction of these markers, rather than the ones taken for granted as the color of the skin, and body physiognomy including sexual organs. In a rather generalized manner, the artist's statement accompanying the work by its artistic director Paul Kaiser, describes the piece as "a kind of meditation on the possibilities and limitations of [representation through] motion-capture." And summarizing it succinctly, he states that "it's all about the notion of breaking free from your own representation and being caught up in it again." [11]

On another level, although *Ghostcatching* as installation conveys a certain level of kinesthetic involvement of the audience compared to the attendance of a live performance, *TGarden*'s shifted emphasis from representation to performance where the audience itself becomes the performer of the work, clearly highlights this sense in a synesthetic interchange with others through their active physical participation

1.2 TGarden

During one of *TGarden's* public prototypes conceived as an open laboratory at the Ars Electronica Festival in 2001, people were invited to experience the environment and give user feedback in order to improve the work's public "usability." Assisted by the team of artists and attendants, a group of up to four people at the time passes through a first phase of transformation entering a dressing room, choosing and putting on a costume designed specifically for this experience. This transformational process is reminiscent of the one Noh theatre's actors traditionally go through as they embody their character previous to their performance. The costumes have different looks. Made of different fabric materials, including plastic rapping and tubing, they are intended to influence movement in specific ways. One, looking like an astronaut suit or an accordion brings a sense of space within the body. Another like an inverted larva filled with styrofoam balls adds weight to the body, making it heavy. In addition to this strong physical influence, the participants are also equipped with accelerometers attached to one of their limbs and head, and connected at the waist to a small wearable computer. These sensors measure the degree of acceleration and gravity produced by the body's physical movement – providing a continuous stream of acceleration data to be statistically analyzed by the central computational system.[12] After adapting their bodies to the costumes the participants are ready for the next transformation as they enter the responsive environment. This space is already alive, filled with sound and images projected on the floor. The audiovisual "climates" of the room are suggestive of various states, which can be warm, cold, energetic,

[11] Kaiser, Paul interviewed by Kent De Spain. "Dance and Technology: A Pas-de-Deux for Posthumans" in *Dance Research Journal* 1999, (20). See also [4]

[12] The accelerometers' "data stream" is sent to the central computer by way of the wearable computer at the waist (i.e., a commercial IPAQ running the Linux OS and broadcasting the data through the 802.11b wireless Ethernet protocol.)

melancholic, etc, depending on the colors and textures of the images and sounds, as well as the participants movements and spatial position. (Figure 2) Besides the loudspeakers and video projectors, the space is also equipped with a ceiling mounted camera that dynamically tracks the participants' x/y position. Both position and gesture tracking of the participants influence the real time computer graphics as well as the musical composition, adding to the system's overall collective synthesis as well as the distinct individual responses. The "performers" tend first to move isolated and cautiously, trying to identify who is producing or influencing what sound or image before they start moving as a group. One of the participants recalling her experience referred to the freedom of movement that her costume allowed, as well as how initially she felt little connections between her movement and the room's media. The longer she played, however, she began to notice relationships emerging.

Figure 2. *TGarden's* environment with four costumed "performers," balls, and computer graphic projections

Aimed to invite a mode of play without strict rules, the team aimed to purposefully design the overall system to avoid a completely direct (i.e., triggered 1:1) response, and instead to generate more subtle choreographed layers of connectivity between the participants and the media that would nonetheless be coherent and accessible. Due to *TGarden*'s emphasis on the physical bodily interaction with both media and other participants, the experience requires a certain level of effort and engagement over time in order to make the response relationships more evident. Interestingly, this correspondence between effort and media response was probably why to a certain extend there was a significant improvement in the quality of the experience when the participants were professional dancers, perceived in the way their movements 'made the costumes come alive,' and in the richer layered media actualization. But, on the other hand it also showed the controlling orientation of the dancers' performance, rather than allowing them to wander about with and be influenced by the media in a more playful manner.

Since *TGarden* is an ongoing research and production project, the team is currently investigating the multidimensionality of responsive environments. The most recent research advances in wearable computing and active fabrics, which embed sensing and electronics directly into the costume's fabric rather than use of cumbersome clunky pieces of electronics attached to the body. Other research arenas include the inclusion of more sophisticated real time manipulation of visual (video with computer generated images) and sonic material, enabling more vivid morphing projections and sound and their dynamic integration**.**

By generating such an unfamiliar but nonetheless meaningful situation, the work attempts to create a new type of public responsive imaginary space and language that brings together new relationships between embodied interaction, physical matter, and media. Challenging the participants to access non-verbal thinking communication that is normally taken for granted, and having individual and collective movement as catalysts for their 'translation' - 'writing' and 'tracing' - into sound and image, *TGarden* brings awareness to the very process of meaning production as it occurs through the interface of the participants and the work itself. *TGarden* challenges restrictive, one-dimensional, purely visually oriented, reactive, and individualistic uses of body-technology interfaces and design, toward multidimensional hybrid interaction centered in the agency of embodiment and dynamic synesthesia to generate meaningful experience. *TGarden's* political engagement with the social body contributes to dissolve the line between art and life, artist and audience, and towards a reinvention of public sphere within the present globalized information society. Thus, *TGarden's* shifting attitude and approach to technology from representation to performance integrating the virtual and visual into the multisensorial physical body of the audience, contrasts with *Ghostcatching's* questioning of representation through the very creation of other visual representations, emphasizing their separateness from physicality, and the division and hierarchy between the artists/work and audience, and between the artists themselves.

2. CONCLUSION

Attempting to become aware of distinct interfaces and underlying politics in the making of *dancetech* works such as *Ghostcatching* and *TGarden*, my *analysis* has aimed to contribute to identify what is at stake in these works, based on the distinct ways they perform and choreograph embodied virtualities. I focused on their experimentation with digital technologies on the concepts and practices as they are tested in this hybrid ground. I argue that it is important to understand how, compared to other dance forms, the distinct approaches to the use and function attributed to technology are informed by or help to conceptualize notions of embodiment, individual and collective identities, as well as technology and their relation. And, in the same way, depending on such intentions, the work can perpetuate the old Cartesian mind/body split or foster new paradigms for the sake of corporeality. With both *Ghostcatching* and *TGarden*, I've tried to exemplify that only with an ongoing non-hierarchical

interdisciplinary collaboration, including the interfacing body and technology as the center of the work, and a critical analysis including identity issues, can new conceptions and practices of embodiment and consequently subjectivity rooted in corporeality be able to proliferate. Towards such a critical analysis my theoretical framework of *dancetech* interfaces aims to be a way of discussing and documenting this cultural production as a process in continuous transformation, which otherwise will leave no trace as a global phenomenon at this particular moment in time. I therefore believe in *dancetech's* capacity to participate in shaping society and contribute to raise the stakes of corporeality and agency in the information age, shaking the dominant tendencies to celebrate technology in a void.

3. ACKNOWLEDGMENTS

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Container Love: Preforming the Body Electric

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ABSTRACT

In this paper, we briefly outline some considerations regarding **"Container Love",** an experimental **preformance** (presentation & performance) contemplating our moving emotional relationships with machines, and everyday practices through and besides already ubiquitous technology such as PC notebooks. Hence, in our Container Love-preformance - which will be demoed at the conference - we utilize a range of resonant & concrete direct interaction styles in order to guide through layers of emotional Man-Machine symbiotic interaction, which manifest power-relation based semiotic narratives of Human-Computer Interaction (HCI).

During Container Love, IR capture cameras tracking the physical location of the preformer manipulate the coordinates of the mouse pointer, which simultaneously manipulates both reactive images, and triggers audio samples. Moving in physical space equals moving in the reactive space of several Java applications which - in combination with oral preformer accounts - answer aspects of our guiding question:

How is it that we are in love with our prosthesis?

General Terms

Design, Experimentation, Human Factors, Theory.

Keywords

(Social Anthropology of) Emotionality, Computational Semiotics, Power-Relation Structures of Human-Computer Interaction, Critical Cultural Theory, Interactive Performance System, Mobility, Mobile Application Design, Direct Bodily Manipulation, Resonant & Concrete Interaction.

1. INTRODUCTION

Throughout everyday practices, we interact with technological artifacts dramatically, as if they make up our everyday partners within the socio-historical context of our advanced capitalistic societies. In fact, they *are* our everyday partners, when we form temporary symbiotic entities, where either we human beings anthropomorph these partners ("I hate you, you goddamn machine"), or they in turn machinamorph us ("Error: You have entered an invalid parameter").

Symbiotic Interaction thus can be operationalized into subcategories, or vertical structures of symbiotic interaction, for example Mutualism, Parasitism, Commensalism, Neutralism, and Competition; a more concise methodological analysis agenda for Symbiotic Interaction from a power-relation based, structuralist perspective has been proposed in [15] by one of the authors.

As above mentioned quotations highlight, highly *rational and rationalized* benefit-gaining scenarios like work, play, and other technological prosthesis-based everyday practices, already bear emotional aspects that accomplish Symbiotic Interaction.

Insofar - preforming Container Love - we hypothesize that not only above mentioned subcategories of power-relations underlay our intimate relationships with everyday technological artifacts structurally, but that we also experience the ultimate emotional roller coaster ride when interacting with these artifacts on an almost profane level *here and now*.

Thus, Container Love aims at investigating and understanding semiotically how *we are actually in love* with our prosthesis, and how emotional layers of this contained love can be expressed through the preformance itself. More information about the actual interactive system and its functional and technical specifications can be found in section "Container Love Specs".

From this point of view, research projects that aim at perfecting Human-Computer Interaction and artificially intelligent technology to the degree where we humans will perceive our interactors as if they were for real – being real because they interact with us emotionally – miss out on the already existent narrative punchline of Man-Machine relations. One could almost say that the often cited, famous Turing Test needs to be reconsidered, and rewritten, because in part it is passed already on an everyday basis culturally, and cognitively.

2. RELATED RESEARCH: THEORY

In this section, we exemplify some theoretical influences that have driven the development of our Container Love-preformance.

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2.1 Cognitive Science & Semiotics

Research on emotional relationships between us and our prosthesis has been conducted extensively. For example, [11] investigates empirically how people attribute concepts of "self" and "other" – crucial to interpersonal relationships – unconsciously to computers, and new media as if they were humans. Cited authors conclude that concepts such as tact and politeness need to be implemented into interactive system design in order to reflect this unconscious cognition. Unfortunately, the authors themselves do not reflect that socio-historical meaning-making systems such as tact and politness change over time, and depend on the macrosociological cultural spaces wherein they are performed.

On the other hand, the study of (computational) semiotics deals with the organization of meaning-making signs, which we think Container Love offers only through the preformance itself, yet representing a coherent system of computer-mediated signs.

2.2 Social Anthropology & History of Consciousness

Sandy Stone has been writing from a more social anthropological, ethnographic and self-reflective perspective in [13], where she examines and foresees the ways computer-mediated communication and computational semiotics masks identity aspects like gender, age, and race. Stone concentrates for the most part on how people establish, cultivate, and disrupt relationships *through* mediating everyday technological artifacts, rather than asking solely how Human-Computer Interaction and interfacing with computers generates an emotional "battlefield of identity" [14] for the most direct participant: the human being interacting with the computer at hand. Still, Stone's research has influenced Container Love heavily, including her "Drive-by-Theory" lectures, where she takes critical cultural theory to the performance stage. Stone's Drive-by-Theory events merge both performance and lecturing, thus already pointing at the direction Container Love follows.

A detailed and elaborate theory of how we dramatically enact and interact with and besides everyday technology can be found in [1]. In addition, [2] has informed research preparations for Container Love regarding the need for contextualizing emotions socio-historically, and semiotically, too.

2.3 HCI & Its Technology-Driven Discourse

The academic field of HCI has brought to life a whole body of research that investigates social processes supposed to be supported by new technologies, interaction techniques, and novel interfaces, e.g. described in [5]. Still, Human Factors and Usability studies follow an enthusiastic overall strategy where it is *preassumed* that HCI will almost automatically bring forth a "better future" through the extensive use of such technology.

The discourse about HCI within HCI is thus technology-driven, rather than reflecting how the everyday usage of already existing artifacts does and maybe should impact usability considerations, that is: what kind of mid- and long-term effects HCI will have on how we emotionally interact with "our" machinery tomorrow, and what kind of mid- and long-term effect HCI innovations had on how we emotionally interact with our machinery today. According to this argument, Container Love serves as a self-evaluation and tries to find out about these mid-/long-term effects from a usability standpoint, too.

3. RELATED MEDIA, ARTS, AND SCIENCES' PRACTICES

The succeeding section presents major predecessors Container Love has had in the interrelated fields of Media, Arts, and Sciences.

3.1 Interactive Performance Systems & VJing

Container Love takes into account more recent performance artworks like CEMI's and Palindrome's joint interactive dance system "Seine hohle Form" [12], although the authors do not wish to compare Container Love with the choreographic impetus of "Seine hohle Form", which leads to audio output through gestural manipulation of physical performance space areas.

Another interesting path adopted present blooming Videojockey (VJ) software systems and performances all around the world. VJing relates to Container Love insofar that the relationship of music and imagery play interrelated, if not equal roles, next to audio/video based performances. Amongst other VJing software dedicated to direct interaction styles, http://www.vjammpro.com should be mentioned, as should be Mac OS-based software like Arkaos VJ, which can be downloaded from http://www.apple.com/downloads/macosx/video/arkaosvj.html; yet another worthwhile evaluation may be VideoDelic, http://www.uisoftware.com/videodelic/index.html.

3.2 Reactive Interfaces

Axel Kilian, currently pursuing his Ph.D at MIT Media Lab, has collected quite an impressive array of Java based application topologies and sketches that relate to Container Love due to Kilian's work invoking reactive virtual spaces [7]. A similar approach can be found in one of the author's ongoing research, entitled "Image Fun" [10].

3.3 IR Capturing Systems & Mouse Alternatives

The original IR capturing camera used - customized to Container Love's requirements, see Section "Container Love Specs" - is manufactured by NaturalPoint and called trackIR™. Since 2001, NaturalPoint markets trackIR™ as a "Hands Free Mouse", and therefore "an assistive technology breakthrough for people with ALS, spinal cord injuries, and other people with disabilities" [9]. NaturalPoint also offers a Software Developers Kit on their Website for download that has been utilized for Container Love.

Other mouse alternative systems commercially available include, for example, CameraMouse Inc's CameraMouse™ [3], which grew out of the Master of Science program in Commercialization of Science and Technology at The University of Texas at Austin. Unlike trackIR™, which tracks IR beams, CameraMouse™ is a motion capture system, but was considered too costly for Container Love.

4. CONTAINER LOVE SPECS

The following section contains brief functional & technical / semiotic & narrative specifications of this project, starting off with a description of the overall academic context where this

kind of research is conducted, namely Mobile Application Design, and Immersive & Collaborative Virtual Environments.

4.1 Mobile Application Design

Container Love was developed within the context of the University of Design and Art, Zurich's postgraduate program "Mobile Application Design" (HGKZ-MAD), which follows an overall concept stating that Mobility, Motion and Movement are key components of our lives [16], and thus have to be equally researched from both social anthropological, computational semtiotics', ludological / Game Studies' [6] and HCI perspectives, especially with respect to the advent of ubiquitous and 3G mobile computing.

Whereas currently empirical studies are underway at HGKZ-MAD, investigating the relationship of "Trust through and besides Mobile Multi-Player Gaming in Convergent Realitites", other HGKZ-MAD research can, for instance, be found at [4].

4.2 Immersive & Collaborative Virtual Environments

At the University of Stuttgart's High-Performance Computing-Center, one of the authors conducts research towards understanding how we can utilize immersive & collaborative interactive systems in order to support, that is: initiate and maintain cooperation between geographically, culturally, and gender-dispersed people in work and play scenarios. We do understand this kind of research as being complementary to above mentioned aspects of mobility, assuming that discourses of both immersion and emission make up major indicators of today's semiotic meaning-making systems of computer-mediated relationships, especially with regards to their everyday-aspects.

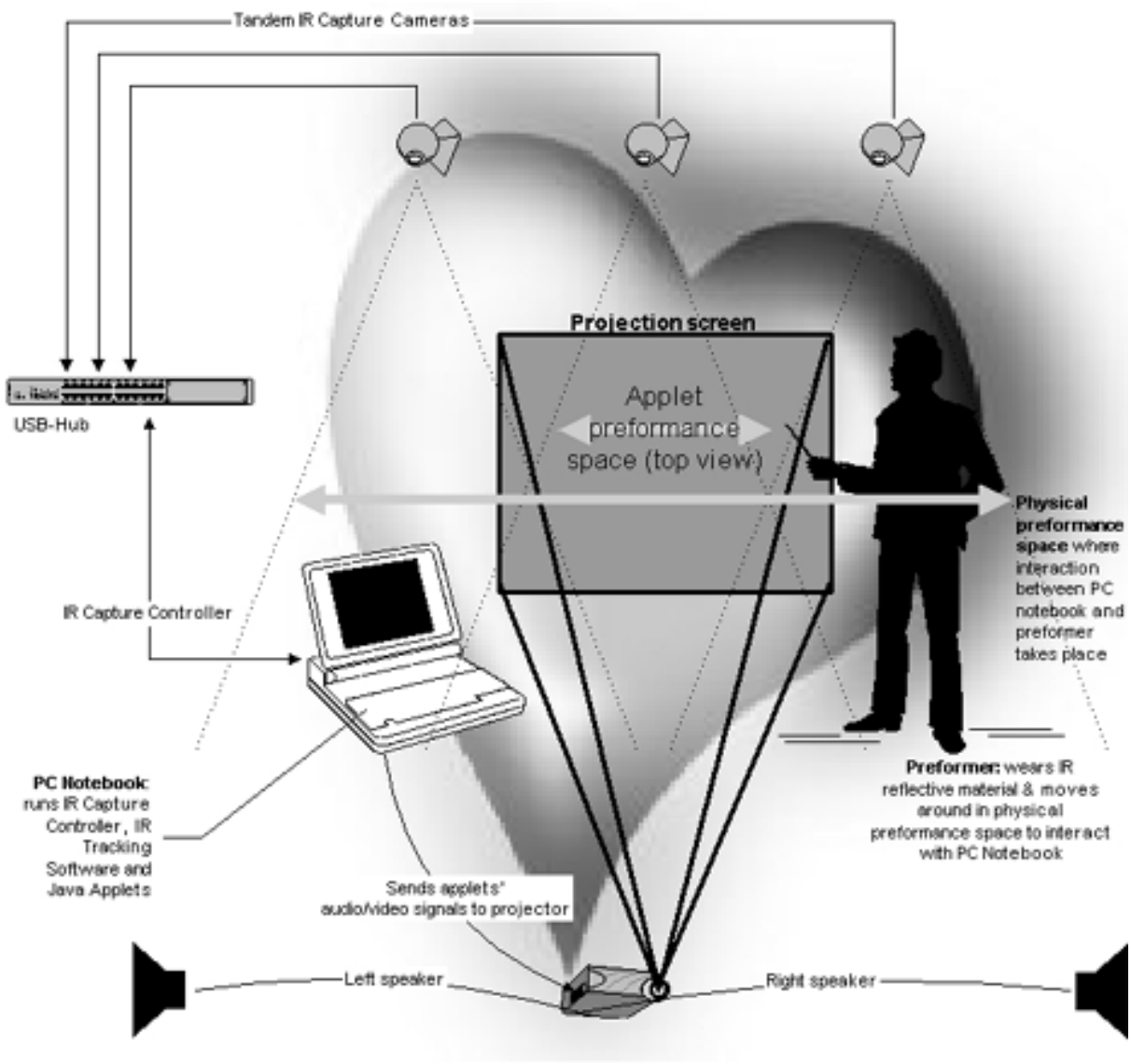

Figure 1. Container Love: Interactive Preformance System.

4.3 Functional and Technical Specifications

In the following two subsections, we present specifications of our joint project as highlighted in Figure 1.

Container Love signifies an Interactive Preformance System consisting of the following parts:

- Human preformer wearing IR reflective material [Optional: Wireless Microphone Headset, including Sender & Receiver (connected to PC Notebook)]
- Set of custom modified, tandem IR capture cameras plugged into a USB-Hub (connecting to the same PC Notebook). The IR unit of these cameras tracks IR light, hence the reflective material mentioned above, and the need for suitable IR band pass filters. For Container Love in its current state, we used flexible filter material passing 800nm and above, so called "plastic polarizers". Additionally, we substituted the original lenses that came with the cameras with 12mm miniature lenses for 1/5" and 1/4" CMOS cameras for an enhanced circular field-of-view.
- The IR cameras were programmed to roam seamlessly; a development kit for the IR tracking devices we utilized is available for download from the manufacturer's website. It is built around an ActiveX component which provides complete object functionality: http://www.naturalpoint.com/dev/tools.htm. Since the IR camera tracking software works on top of the system's OS, there was no need to code an API between the Java applets mentioned below, and the original software
- PC Notebook (+ Projector) hosts a range of Java applets within a web browser, see section Semiotic & Narrative Specifications for more details on the applets
- Above mentioned Java applets do react upon movement of the mouse pointer, that is: movements of the human performer; the moving mouse pointer manipulates the reactive image space, and parallely triggers audio samples upon certain locations of the mouse pointer
- [Optional: PC Notebook running speech recognition software and reacting upon human preformer's key sentences, e.g. "I love you, machine"]

Container Love preforms experimentally how we contract a temporary symbiosis with our everyday machines. We are inside the machine, whereas the machine simultaneously dictates how we may move, see [8]. Therefore, while being bound to this notion of mobility, we also perform emotional (=moving) facets of an emotional relationship together with our counterpart. Through literally stepping away from the "natural" location of interacting with a PC notebook., Container Love shows how we sustain a love-akin relationship with an technological artifact, based on semiotic meaning the performer assigns to these artifacts, whereas the artifact in return assigns meaning to the preformer.

In order to better understand above outline, Container Love will be demoed during the presentation of the paper.

4.4 Semiotic & Narrative Specifications

Prototypical examples of the Java applets and the overall narrative (without further explanation or controlled preformer interaction, and – naturally - without utilizing the IR setup) can be found at http://www.playbe.com/containerlove/intro/index.html.

Container Love totals to eight consecutive Java applets expressing love-related audio/visuals of emotional layers. The applets mimic the narrative course of an assumed, unhappy-end relationship, spanning from love "At first sight" (Figure 2), to Curiosity, Fun (Figure 3), Sex, Happiness, Fight, Boredom (Figure 4), and Memories, respectively.

Figure 2. Container Love: Applet "At First Sight".

The following paragraphs exemplify three stages of this assumed relationship in more detail, where symbiotic power-relations between human and computer come into play.

4.4.1 At First Sight

On start of the Container Love performance, the preformer treats the PC notebook as if this notebook was a prospective emotional partner. Both performer and machine engage with each other spatially whilst this engagement is expressed through the first Java applet that translates a typical situation of a first encounter in a Fast-Food joint.

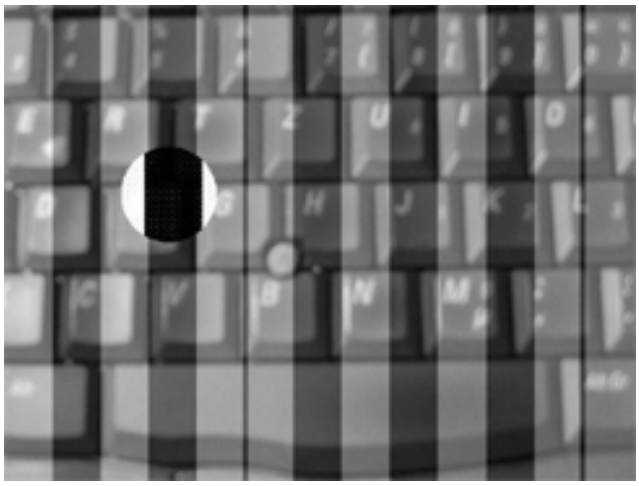

Figure 3. Container Love: Applet "Fun".

The spatial relationship dividing preformer and notebook determines the applet's audio- and visual output. Moving in physical space in-between the preformer's and the PC's applet positions causes the applet to play an encounter-like theme. Any given physical movement will move the mouse pointer and magnify the underlying part of the Fast Food joint picture. Approximating the PC will trigger audio samples that increase in their intensity. Moving correctly in space-time in direction of the PC, the audio samples will match with the playing theme. In other words: the performer will move as if he is attracting for courtship.

4.4.2 Fun

The Fun-applet shows the notebook's keyboard with an claviature overlay. Moving in physical space moves the mouse pointer in the shape of a circle and causes the applet to play piano samples; so the metaphor of both performer and notebook having fun with each other is translated into the performer playing the "right" keys leading to an assumed sexual arousing.

Figure 4. Container Love: Applet "Boredom".

4.4.3 Boredom

In our boredom applet, both notebook and performer have reached a relational stage where they can only yawn at each other. Moving in physical space triggers gape-like sound played by the applet, thus expressing the feel of the overall relationship. The mouse-pointer within the running applet is substituted with a picture of the scenario itself.

5. CONCLUSION & FUTURE RESEARCH

Future research taking Container Love one step further includes a much stronger utilization of VJing software such as mentioned in section Related Media, Arts, and Sciences' Practices. Hence, we aim at introducing streaming video instead of static images into the Container Love narrative, and insofar investigate the semiotic interrelationship between audio, video, and interactive preformances.

We consider Container Love to be a meaningful contribution to an ongoing debate in a variety of media, arts, and sciences fields, investigating how we are in love with our prosthesis. Being an experimental set-up, Container Love may serve as a blueprint for future endeavors towards emotionalized (wo)man-machine interaction, and simultaneously points us at how far-reaching our everyday relationships with technology are already shaping our lives.

Container Love would also allow for other preformers to test how they feel about a simple notebook; thus, in a more advanced state, Container Love should be both usability tested and analyzed qualitatively.

6. ACKNOWLEDGEMENTS

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EXHIBIT

COSIGN 2002

The Noise Simulator

Artistically researching the possibilities of VR

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ABSTRACT
With the Noise Simulator project I'm researching the possibilities of VR from a non-technological, artistic point of view. Trying to find out how VR can add new fascinating experiences instead of being a lousy copy of reality.

General Terms
Experimentation.

Keywords
Real Virtuality ← → Virtual Reality, VR content, Experimental Content Development *experience research, alternative power source*

1. INTRODUCTION
As an artist, with a non-technological point of view, I have researched the underlying principles of Virtual Reality by attending VR congresses (e.g. the VR world congress 2001 in Barcelona) and by visiting researchers and talk with them about their work. Here I noticed their drive to perfectly imitate reality, that seems to be common in VR developement. In my opinion this often results in lousy copies of reality. When experiencing current VR installations it becomes obvious that most technicians are not trained for designing experiences. VR artists on the other hand often seem to focus on the technical aspects, which results in nice 'technical tricks' instead of experiences that add something to our reality.

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I've experienced a lot of installations, trying to find the essence of VR through personal experience. They were technically beautiful, but their content often was boring. So I've decided to do better.

I want to design VR experiences with the experience as a starting point instead of trying to extend the technical possibilities as a goal itself. To do so I reversed the VR principle, and started experimenting on a side-track.

2. WORKING PROCESS
2.1 Noise Simulation
To express my criticism on VR I have realised a virtual phenomenon, I reversed VR to Real Virtuality. Therefore I have developed an installation, which simulates VR, without using computers: the Noise Simulator. In this noise (the 'snow' image on the TV screen) I am looking for inspiration. This experience machine creates an experience of noise by shooting black and white rubber bouncing balls at my guests for one minute, causing a bouncing ball bombardment.

The first version of the Noise simulation installation (see figure 1) I have built during the last two months of my final exams at the Institute for the Arts in Arnhem (1999).

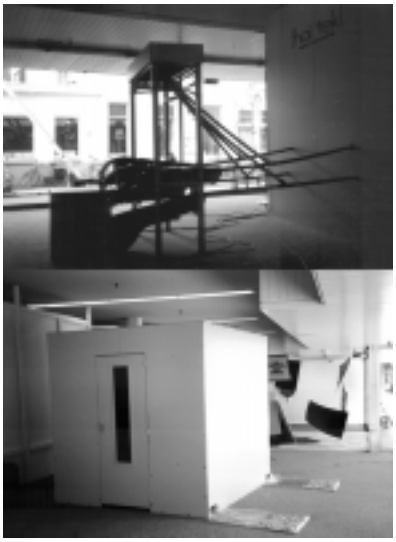

Figure 1

In the three years following I have developed this installation to the full automatic caravan version as it exists now (see figure 2).

Figure 2

A fully collapsible installation, built from household equipment (vacuumcleaners, leaf blowers, lemon-squeezers etc.), Which is able to shoot bouncing balls inside the caravan from four sides with 100 mph, without being dangerous for the person who's standing inside this noise. Until now 700 people from 2 to 84 years old experienced this noise, helping me to develop it with their reactions.

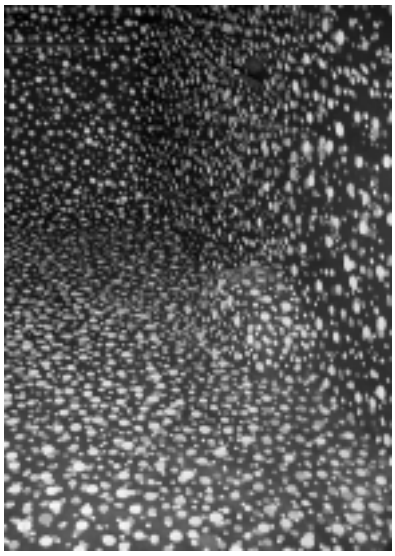

Figure 3

The interior of the installation (see figure 3) is covered with a noise pattern that is enlighted with strobosopic light during the experience. The visitor is wearing a special suit which 'dissolves' the visitor's body in the noise. (see figure 4)

Figure 4

The installation is constantly 'under construction' (partially) based on the reactions of the visitors. I'm interested in using the visitor's imagination, by creating an experience that allows them to have their own associations. There were 700 different experiences in the Noise simulator. From claustrofobic to universal, the 'Alice in Wonderland experience' or a way of experiencing hyperactivity disease (this was experienced by a doctor), the remembrance of a hail attack at one's caravan and so on… All created by one installation.

2.2 Translating Real Virtuality back into VR

The goal of the virtualisation of the Noise Simulator is to create a virtual experience that is just as intense as the original. I want to investigate how I can use the specific qualities of VR to achieve this. I don't think that it will be interesting to create an exact virtual model of the installation. (Getting hit by virtual balls?) One of my visitors gave me the starting point when he told me that he had phantasized about how it would feel like to be a bouncing ball.

One of the unique characteristics of VR is that you could have your experience from any point of view. Untill now that often is the human point of view. But why not experience how it would feel to be a bouncing ball in the Noise Simulator? Being shot into the caravan, hit, bounced, sucked into a hose, swung around, and shot again.

To be able to create this feeling I'm going to try to experience these movements myself first in rollercoasters, gyroscopes, bungee jumps etc. How does it feel to bounce? And how can I create that feeling for my visitors?

2.2.1 An alternative power source integrated into the experience itself.

I've noticed in the VR experiences that I've had untill now that my role in the experience, by physical means, often was quite passive. Standing still with a mouse in my hand or wearing a dataglove, my bodily movements being reduced to turning a little or being strapped in a chair that moved in all directions. Just like

in our everyday lives were sitting is one of the most common positions of our body. We sit behind our computers, in our cars, on the couch in front of our tv, at VR conferences, in the Netherlands it can even mean 'to be' … we live our lives from our lazy chairs and it starts to become uncomfortable.

That's probably one of the reasons why force feedback was invented. In my opinion the current force feedback is one step to far ahead allready. Technicians try to built complex machines to create simple physical experiences. In my installation I want to make use of the possibilities of the human body, visitors will have to move their body's if they want to have the experience, I will try to incorperate their movements into the design of the experience in such a way that visitors are creating their own physical feedback. Next to that I want to use the energy that is generated this way to feed the whole installation. With this I want to investigate if I can use alternative power sources as an improvement of the experience itself.

3. CONCLUSION

I think researching VR from a non-technical point of view can be a valuable addition to scientific research. In my opinion until now the VR technique itself distracted most of the attention from the experiences created with it. Which often leads to boring VR experiences that are ignorant to the possibilities of VR compared to reality. It seems to me that even a lot of the VR artists are often more technician than artist, falling for the nice tricks of the technique itself instead of using it to create new experiences.

In my work VR is the logical next step to be able to create the experiences that I can not create in reality anymore. I'm interested in using the visitor's imagination, by creating experiences that allow them to have their own associations. Next to that I would like to find ways to narrow the distance between reality and virtuality, making experiences on the borderline. Trying to break through the passiveness of most VR worlds.

So I guess that's enough for many years of researching. I'm really interested in receiving feedback from other VR researchers (from any discipline) and possible coöperations with them.

4. ACKNOWLEDGMENTS

My thanks to all the visitors of the Noise simulator who helped me to develop the experience with their reactions and to everybody who contributed to the development of the installation itself.

AMORPHOSCAPES

STANZA

www.stanza.co.uk

ABSTRACT

Interactive, generative, audio visual, digital paintings and drawings created specifically for the internet. This is interactive art on the internet, incorporating generative sounds and 3D imaging. Amorphoscapes, provide a seductive, multisensory non- linear and interactive experience for the audience to immerse into.

1. INTRODUCTION

Amorphoscapes by Stanza are interactive, generative, audio visual, digital paintings and drawings created specifically for the internet. This is interactive art on the internet, incorporating generative sounds and 3D imaging. Amorphoscapes, provide a seductive, multi-sensory non-linear and interactive experience for the audience to immerse into. Cellular forms replicate, intricate webs evolve, moods and colours change and fuse, sounds and rhythms pulse and change. Amorphoscapes allow the "user" to experience each artwork differently, depending on how they choose to navigate.

As well as providing this non-linearity, some of the pieces change over time, ie they generate. The "user" controls these evolving pieces through movement. The character of the resulting piece is unique to the user. This change in the relationship between the 'user' and the artist changes the perception of the artwork. The user can choose what they experience. At any time the user can make subtle or total change to their Amorphoscape whenever they want to explore further. Or simply watch the piece change itself, in a generative way.

Amorphoscapes are audio visual paintings, and can be installed into 'real' environments, where the movement of people in the room or gallery triggers the interactivity within the work. They could be thought of as drawing and paintings machines, in the future to be projected, onto buildings, on clothes and on cars, and on large plasma screens in your living room.

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Most of these works have extensive mouse control. As the user moves, the light and the image / lighting changes. To view them go to the website www.amorphoscapes.com. Make sure you let each work download. They all work online within a browser and as such can be defined as net artworks.

These pieces are all quite small in file size because they are intended to be accessible to everyone on the net. While the original intention of the Amorphoscape series has been for internet - specific exhibition, more complex pieces may be built and adapted for offline use and exhibition purposes.

Amorphoscapes have been reviewed on ITV in the web review, and featured on sonic artsnet for the gallery channel, soundtoys, rhizome and sonify. 'Generator' was featured on the designers network. They were shown at transmediale in Germany, at cynet art in Dresden.

All the works are online and as such are internet specific artworks. All online at www.amorphoscapes.com. They are not downloadables or software but exist within the online environment that is the internet.

2. WORKS IN AMORPHOSCAPES

Works in the series include:

generator.....1999 - 2000

An environment with sounds that can be selected that allow images to be altered. Cellular automata. The cells generate and move when the user makes them. A choice of sounds on the right allows the independent selection of sound to image. This piece was shown on ITV in the web review and featured on sonic arts network for the gallery channel. Also shown on the designers network.

matrixcity.....2000

Two versions. A sort of beautiful industrial drawing environment. Grey landscape mappings of wires that move around. An abstracted space with clunks and squeaky sounds. Controllable by dragging and moving through the space.

landscapes...2000

There are 12 pieces in the series with multiple sounds, all mouse controlled. An ' invisible' menu appears on the left of your screen for navigation, move the mouse under this.

univercity..... "my universe is expanding".. 2000

With generative sound mixer built into the piece, click on the small squares to change the sounds. Just sit back and watch as

the universe get getting bigger. The sounds evolve over time and change pitch.

hybrid.... 2000

Digital painting and drawing installation. It moves when you move. If you go left, they go left. Completely immersive colour environment online. Change the colours and watch them 'bleed' into one another.

traces.....2000

Digital painting and drawing installation. You can change the marks and make your own textures. This makes very subtle black and white images based on your movements which build up on the screen. This is a sort of 'drawing machine', online, spewing out fine dots and lines to make digital drawings. There is a generative sound processor built into the system.

biomorphs.... 1997 - 2000

Mutating cells that self generate, with generative sound control. The cells move about replicating, while the soundscape at the top generates itself. Based on drawings of cells and cellular activity these works play with the idea of the cell being a highly adaptable structure whose movements create interesting visual patterns.

soundscraper ..... 1999 -2000

Series of six multi sound environments. Lots of built in sounds and layers.

painter.....2000 -2001

Formal coloured painting environments that move when you move. The colours are all blended together to create an online painterly colour wall that changes (or can be changed by the user) over time. The colours fuse depending on your position on the screen. The idea was to brighten the internet up.

cancer.....2001

This small cancer - based online interactive generative cell grew out of discussions with researchers the chairman of Inbiomed, a Cancer Research Company in Spain. The piece replicates cells online, spewing out small images and regurgitating generative sounds. Cells generate and move in parallel then birth new cells and kill off old ones. This piece "cancer" is a generative piece, it just does its own thing. You can choose from a variety of cell - type.

numbers.....2001

Numbers system painting series, all based on sequence 3, 6 and 9 and evolving into a random numbers pattern generator that is position controlled and moves when you move. A labyrinth of lines, tones and numbers. Treat the surface of the screen like a canvas for drawing on.

cellular...."cultura".....2001.

A series of painterly micro cells are manipulated and breed and replicate on top of one another as you move around. Based on the idea of cells as cultures this online installation allows you to play around with different cells colours and evolutions. While you do this sounds generate in real time and reprocess themselves. Cultura is a spatial compositional environment with sounds that evolve that are positioned in the space of the visual composition. You can explore the audio visual fusion by moving around the environment.

genomix.....2001

genomix...genome baby maker - an interactive online installation. It allows you to cross-reference all the patterns on the genome sequence and intermix or breed your own variable, allowing you to look at the new mix of chromosomes in real time; on line. NEXT versions will allow you to keep and print this pattern and to have bedspreads and curtains made in your very own post genetic mix.....mutant..... stills, gallery essay .... and text ..... online.

3. AMORPHOSCAPES: AUDIOVISUAL SYNTHESIS, A NEW KIND OF PAINTING

Amorphoscapes are a new type of image and a new type of painting. A definition could be; "a self contained online image experience". They react to users and are in turn influenced by the users movement. These paintings are generated, they use programming languages, and incorporate manipulated images using software to create them.

These works are an audio-visual synthesis. Its not about sound at the expense of the visual element. My work is about the marriage and synthesis of the audio visual potential exploring the internet as a medium in its own right.

To engage with my online work the user must participate in a number of ways, not only as a passive observer but also as an active 'user'. The user is directly related to the shifting audio visual language that moves only when the user moves and shifts with the works. The choices are made by the user, but clearly the aesthetics are defined by me, the artist. The use of specific types of sounds, colours, patterns and lines are all defined parameters within each work. But in the new online works in my 'Amorphoscapes' series, the user can move these lines and colours in a constantly shifting changing audio visual experience. So now, where once the viewpoint was fixed and static, the parameters are allowed to be changed,

These artworks have become mostly non-linear and multi-layered. The visitor to such an experience is paramount to the understanding and meaning of the artwork. Only by engaging with the work will he understand that he himself essentially determines what he will see. This it could be said has become true of all artwork, but within the interactive works, each user thus creates their own artwork, and more importantly the artwork becomes increasingly co-dependent on the user and their input or interaction.

Amorphoscapes as digital paintings inhabit the worlds of art, music and design. As artworks, they are an extension to the modernist grid; except now the grid is multiplying and shifting. Moving into another dimension of multi user input both from the audio and the visual. I like the idea that these works embrace the art of drawing and painting; in fact they act as autonomous drawing and painting machines.

Each online installation is an experimental attempt to make an interface which is interesting to look at and expressive both

audibly and visually. So the new interactive works are variable, and with my "Amorphoscapes" series, they also allow you to do it online, globally, in real time as internet specific artworks. i.e. this is net art.

It is interesting to set up some limitations for the internet; it helps understand where the net and net art is at the moment. The amorphoscapes are quite small in file size, usually up to 100k sometimes 200k if there are lots of sounds. Its means the user can actively engage with the work, quickly and in real time. Because of this, design plays an important part in the overall aesthetic. Big graphics and large sounds files are avoided, to aid consumption via download, because of bandwidth. The entrance to the gallery is a 56 k modems, so I respect the audience by not putting up large downloads.

So the cube is the gallery, but the internet can also be extended outside the cube into the real space. I recently set up a series of satellite links from my websites, the central city, and some of the Amorphoscapes series. I took my laptop into strange spaces to move the internet into the real world. Certain works were then changing over the net, and inside the corridors of a hotel a huge projected Amorphoscape was being shown. I also used a very small projector and display, and set up small six-inch web artworks in the park and in the street. These new interactive works can be taken off the box and displayed as interactive installations triggered by the movement of people in front of the work. Using the sound based extra, as people approach the work starts making new objects, and cells started replicating. And as they move away the piece stops.

I have also been asked to present these works at galleries. I am developing touch sensitive screens versions of the Amorphoscapes series. Very large plasma screens can engage the user and allow the Amorphoscapes a more subtle engagement that becomes more like an integrated and playful audio visual experience. They can also allow multi user experiences in sound, and visual connectivity. The digital artworks will download to phones, TV and advertising billboards. The new digital art will be embraced both as a background ambience and a way to stimulate the everyday mundane.

They can be changed for daily enjoyment and pleasure as well as to help enhance the environment. In your living room, or business environment, when you walk past them they will move. They can be made to generate and replicate all day. Also when loud people are talking they can be set up to move and evolve and when people sit quietly they could be set up to slow down and stop. The digital paintings amorphoscapes, could be called "visually dynamic systems", I think someone has mentioned that before. These works are aligned as a contribution to re -new the aesthetic of the painterly process. My interactive paintings are similar to real paintings in that they involve space, colours, texture, and light (although in a different way from the physicality of the painting as an art object.). But none the less similar formal valuations can be seen in this work as can be seen in certain colour field painting of the late sixties for example.

4. CURRENT DEVELOPMENTS

So what's next? 3D multi user environments with generative evolving sounds, the creation of "beautiful paintings on the net", moving in three d, user controlled, fully immersive experiences. These works will be sold in kits from websites, and viewed on large plasma screens inside domestic areas, screens that constantly change. The complications of creating sounds online within small file size packets have also led me to try creating generative sounds. First via lingo within shockwave, and now within super collider, the audio synthesis software. Small files based in sample banks can be called and played in all manner of random and strange ways. My interest here is to use this online via shockwave so I have been trying to get an extra written that will allow generative sounds to be controllable via shockwave. This will allow very small sounds files to be incorporated into the works, l leading to sound-based works where users can change the parameters of the file, and the sound file will keep changing and generating in new and interesting ways. The extension of the music can also be expand to allow the global multi user experience where the composition is an evolving structure that has nodes that can be altered by many people all in real time.

New works are continually added to the series. Over time I plan to edit and rework various areas in the site to reflect the evolving nature of the internet. The beauty of the internet is that nothing is finite here; everything can be changed and re-evaluated. The constant scratching of the surface allowed by increased bandwidth will allow larger use of graphic and larger sounds files and constant reworking of other media but this particular reworking of surface is most relevant to the interactive works where ideas, codes, and whole sites can evolve.

In the future I envisage this work will be used as addition to the advertising and corporate environment, to compliment urban spaces, and for internet locations in urban locations, as interventions; i.e. as satellite projected space to refocus the energies and ideas that situations contain. Developing on from this we might present ideas via a live website in the real world, or in a corridor in a hospital or even as a micro site (by this I mean website on cells that are so small they are unperceivable); websites on our shirts and websites on the bus.....or rather digital artworks evolving and spreading upwards outwards and into our lives.

Next we will have multiple users controlling multiple artworks via online networks using wireless technologies.

5. SOUNDTOYS: NEW AUDIOVISUAL EXPERIENCES

As an extension to my own sites which provide a platform for my personal experiments in net art, I have set up an open gallery site, soundtoys.net, which provides space for artists at the fore of the audiovisual field, giving focus to their developing art forms. The site aims to help link up other artists, and to act as a showcase for artwork and artists working in new

media. It is intended as a place for artists to exhibit their digital art projects. Future plans for soundtoys include cd roms, a book, specially commissioned works, themed shows and presenting exhibitions in festivals and galleries worldwide.

The marriage of the visual to the audio is increasingly becoming a central issue in the development of interactive media on the web. The soundtoys.net site is a fusion of the arts and media incorporating a wide range of approaches to the medium of the internet and audio visual practice. The internet has become the leading economic and artistic tool for our age. Words like 'emergence' are used to explain the propulsion of these medias into our daily lives. Convergence is used to fuse the meeting of media onto the paradigm of new technology. Our exhibition series and website is for artists to research the paradigms of audio visual practice. It also functions as a fun site where the new and cutting edge of artistic research is exhibited and can be engaged with as online internet experiences. The site is a growing community of audio visual projects, and artists interviews, links to resources, and texts by contributing writers. Hopefully it is a fun and entertaining site, while also providing valuable information.

Soundtoys and multi-user environments are increasing becoming popular on the web. We are finding commercial ventures using gaming and soundtoys for their advertising and branding. Also soundtoys has seen a number of other sites staring to develop very similar project to ours. We would like to think we were here first; but hey we don't mind. It's good (apparently to have competition and now other people are commissioning audio visual projects. So it's seem soundtoys are an art form, that might well be in its infancy on the net.

So what are soundtoys?

A definition for Soundtoys could be new audio visual experiences, and this includes art, games, generative music, interactive environments, shockwave, etc. Soundtoys explores multimedia experiments and the parameters of our new media world. This is one possible definition. Artists who contribute are also invited to come up with definitions. This is not to pin down what sound toys are, but to expand on the possibilities of this new media .The site looks at the serious issues around interactive arts, audio visual synthesis, generative art, and a history of interactivity. Increasingly a divergent group of artists are exploring, researching and playing within the parameters of soundtoys. From designers to fine artists to musicians all expanding on there own work and merging within the online audio visual domain. The diversity of the internet is reflected in soundtoys site, and the fact that artists are exploring so many technologies means many technologies are explored including shockwave, flash, vrml, java. The soundtoys site offer insights into the diversive and creative nature of the web which is available to today's artists. (see www.soundtoys.net)

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Exploring the field of net specific expression (language)
Extracts/some pieces on c.re.ations

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1. INTRODUCTION

Working on the Net since 1996 I have pursued the idea to explore and develop “the language” from inside the medium, in a practical way, by *creation*. In fact the process was/is an interplay of creation and reflection – developing and checking ideas in realization.

My intention was to fuse different media in Net-art pieces by “using” net-specific possibilities. Often ideas develop out of the tension between different media, i.e. text and picture, image and animation (static and in movement), visual and audible.

2. ASPECTS/KEYWORDS

- possibilities/experiences in/of collaborations (creative communication, working methods, limits and 'broken' borders).
- (importance, conjunction and difference of) mechanical (mouse) and mental interactivity.
- the structure (construction) as a form of expression.
- the timeline - linearity, inter-linearity, poly-linearity and the dissolve in hyper-structure.
- poly-media - conjunction/fusion of different elements (word, picture, sound + interactivity), media and the different meaning/optionalities of the parts.

3. SAMPLES/PIECES

desire, breathe, vib~ratio~n,

e[y]gg[e], frgmnt foUr [01 - 3.3], LaCaRa*BoLa [taste.it.d]

breathe (poem by David Knoebel, 2000)

is a visualized poem or a verbalized picture - the picture embraces the text and the text the picture. Visual elements (form, colour) “open” words of a poem. The mechanical interactivity is set to "onmouseover" completing the line, while "onclick" goes to the next paragraph. The last word of the poem is spoken. At the same time you enter a page with the complete picture, where you can re-construct the poem.

Breathe is a *plateau/plate*. Unlike a “traditional“ hypertext work it is not split into separate html pages, but programmed as one dhtml page with 24 layers. The visual impression of the recipient is that of looking at ONE page, like a picture. The experience of a multiple page work is like browsing, going from one page to another, forced by the change of the visual content of the whole page. A process of “unfolding-inside“ is realized in a *plateau*. The page is not refreshed as a whole but parts change or become visual/are unveiled by user activities.

Beside the onmouseover and onclick action of the mouse, the mouse-movement itself, seen as imaginable lines drawn on the screen, creates an abstract drawing enduring the expression of the piece. The visual part no longer can be seen as a pure interface. While still having the function of navigation, the kind of mouse-action transports ”expression“.

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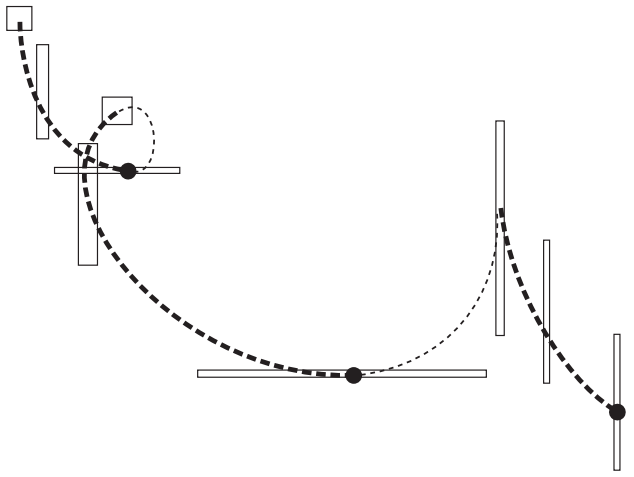


mousemovement in *breathe*

desire (text and music by Miekal And, voice by Martha Cinader, 2000)

is a more complex piece, realized in dhtml (24 layers) + Real(streaming)Audio. The linear text of Miekal is broken in different parts, some static, others (Javascript) animated. The movement + background music is used to dramatize. The streaming spoken text contrasts the “inner” reading of the written text (and creates a sense of the personal, a personal touch). At the end a pattern of "unreadable" text visualizes the content of the text.

Like *breathe*, *desire* is a *plateau* work, opening in a separate window. Text-links are used for navigation, unveiling, mixing different paragraphs of Miekal’s text. The streaming text parts open in separate windows in front of the main window, contrasting visually the different qualities of written/read and spoken/heard text. Somehow the navigation (and the mouse looking for links) is jumping (increasingly) like the “random“ animated words in the piece.

vib~ratio~n (original photos and sound mix by Bill Marsh and Octavia Davis, fall 2000)

is a poly-linear (Flash) piece. Details of photos are loading (streaming) at the opening of the piece. These details become the function of links. The viewer can start different *events* which can be mixed and generate a fluid picture.

Poly-medial pieces can be seen as modular “constructions“. While i.e. *breathe* is built with colour, form, words, lines, etc., *vib~ratio~n* is arranged in *events* (animated visual + audible sequences) running over a limited amount of time in strings. By combining and overlapping these strings a poly-linear structure is created - a “*cummulation*” of single events.

*e[y]gg[e], frgmnt foUr [01 - 3.3], LaCaRa*BoLa [taste.it.d]* are part of a series called "time-series".

These flash pieces explore possibilities of linearity in hypermedia - combining linear events with nonlinear elements.

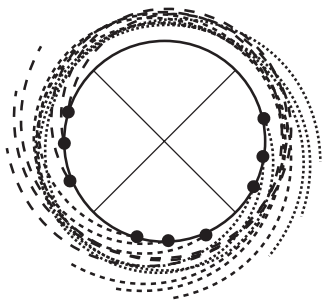
E[y]gg[e] - *[a meditation about time and space on the Net and elsewhere]* (summer 2000) consists of a pure text and a “visual” part (except some spoken words and music). It is split into a “row” of linear events, playing with different forms of mouse-activity (accessibility) and filmic elements.

The text about to be read before experiencing the piece does not explain the Flash components, but corresponds with them, leading the viewer to think in a given direction. The aspects of “time and space” (Walking - The Net is a time- and spaceless environment in which you move), “linearity in film” and “different user habits in the reception” (Gestures - Film, Painting and Net Art), written about in the text, are applied in the interactive work.

The interface with touchable handles “illustrates” on an abstract level the visual changes, sometimes opening other interfaces (i.e. “moving dots”, “shrinked world map”). Onclick- and onmouseover-actions are used in different combinations, opening/closing, starting/continuing/stopping (with different associating metaphorical meanings). Analogous to a “real walk” , every started event has to be closed to continue.

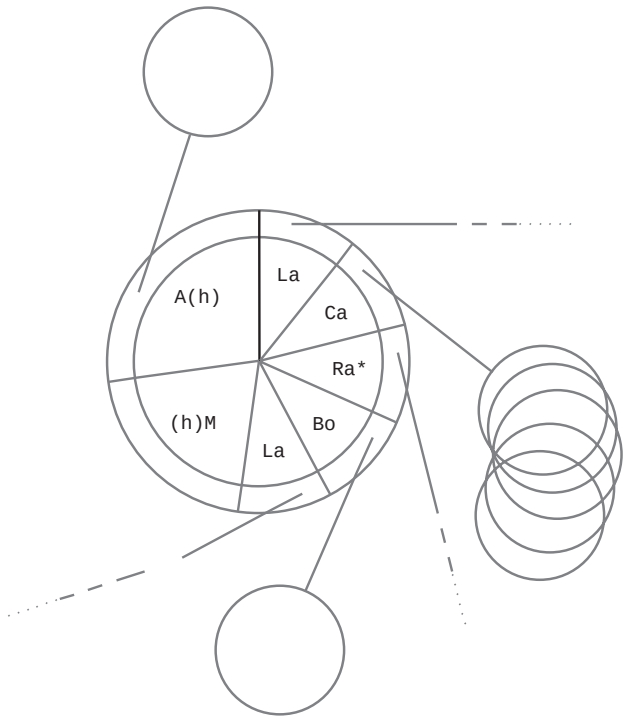
frgmnt foUr *[01 - 3.3]* (a collaboration with David Knoebel, 2001)

is an open-hyper-structured (streaming) composition, growing over (dispersing in) time. The piece uses a time-based interface, in which the viewer can open different (linear) running streams and combine these. Visual, textual and audible elements are used as independent parts/fragments, opening associative combinations.



structure of *frgmnt foUr*

Like *vib~ratio~n*, *frgmnt foUr* is a poly-linear piece. But this time the interface itself is changing over time, which increases the fluid character of the piece. Interestingly a “shifting in time” experience is created by the overlapping timelines. This corresponds with the structure of the work. Strings running from a loop (circle) form a kind of whirl. Following the mouse-movement, imaginable lines swinging up and down are drawn.



structure of *LaCaRa*BoLa*

LaCaRa*BoLa *[taste.it.d]* (photos sent by Alexandre Venera, 2002)

is a poly-medial and poly-linear interactive-visual-sound-poem where principles of *frgmnt foUr [01 - 3.3]* are used in another way. It was created for Alexandre Venera's (Brasil) *acarambola* project, playing with the syllables of the word "a carambola".

The work is arranged in such a way that it can be experienced in and on different levels. First, as a (dadaistic) sound poem, repeating the single syllables by touching the letters in the stream (onmouseover); second, by starting events (onclick). While in the fluid interface of *LaCaRa*BoLa* a link only is active at a specific moment (highlighted in the interface), after an event has been started one time (by onclick), it can be influenced by the viewer at every time. The recipient gets all "mixing" options. The poly-linear piece transforms to a mixing tool.

4. SOME MORE IDEAS/NOTES

Looking at Net art pieces *Interactivity* is understood from the perspective of hyperlinks, the character of choices in hypertext pieces, or more generally the manipulation of a piece through user input. The hyperlink opens the way to *hyper-structures* with the option to transmit complex content. Focusing on the "mechanical" action, moving and clicking the mouse, the kind of interaction/"touching" can become a tool of creation. It can endure or enhance expression in an environment where "mental" interactivity (participation of the viewer through reflection) is initiated.

The notion *poly-media* is used analogous to polyphony in music. When building more complex net-art pieces with prose text or movie, linear running (viewed, read) parts are combined. In creating an interactive environment, the idea appears to run these elements/media simultaneously, and a *poly-linear* structure develops.

Like in earlier pieces it is still the method of "*cummulation*" with the intention to condense content (*condensation*) by piling up. In contrast to a layer construction (i.e. *breathe* or earlier works) the parts themselves submit more complex (on a less abstract level?) "information". *Inter-linear* means that like insert cuts in film, linear running events can be embed in another string (examples: the second link on the sequence below the picture in *e[y]gg[e]* and *the doorman*).

URL: http://netartefact.de/repoem/creations/

THE GATES OF PARADISE

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Visual Poetry**:** The Shape Poem**:** Shapes tell the words what to say and words tell the shapes what to form.

I have been creating words out of shapes and shapes out of words for over sixty years. When I was young, I dreamt of a magic oil painting where one could over-paint over and over again on a permanent magic canvas without ever ending in mud. I dreamt of a writing where one could continuously re-draft, correct, and perfect on the same piece of invisible lined magic paper without eraser crumbs and rips and endless rewritings by hand and irretrievable losses of covered ideas. Electronics have made the impossible possible. Magic has once again become science. Before the computer my poems would not have been impossible to do. I might have created 20 with a roomful of kind patient 12 hour a day lead shaving linotyper monks in 200 years. My process is this: I invariably wake up at 2 0r 3 AM with a visual and word idea. I write it down 2 or 3 sentences at most on a piece of paper and go back to sleep. I place the note next to my computer the next morning. In a few hours or days or weeks I look at the idea on the piece of paper and start writing. I print out almost every change as I work to save my work safely and to see what it looks like printed: Minute differences are sometimes difficult to catch on screen. What You See Is What You Get is not yet perfected. Examples of my poems printed out at each modification, (up to 250 for one poem,) so that every change from slight to gross is recorded, may be found archived at**:** The Poetry/Rare Books Collection State University Of New York At Buffalo [1] and at**:** The Sackner Archive Of Concrete And Visual poetry. [2]

The most prevalent question I am asked about my shape poems is: Is it true that you create these visual poems in Microsoft Word? My answer is yes. I use Microsoft Word 2000 installed in Windows 98 on a PC with a Cellaron 4 Mega Hertz motherboard Mega Hertz plus 256 MB Ram plus a 4 gigabyte hard disc. and a 21" SONY G520 color monitor. I started out in 1988 with a 286 PC with Word 1.0 in Windows 2.0 on a 10 MB hard disc and a 15" color monitor. I have rewritten and reshaped as I have up graded computers over the years. I believe this has allowed me a hitherto unknown subtle possibility for refinement in my poems. When my poems are perfected in Word, I print my poems to Adobe Distiller which makes .pdfs. Many different printer drivers print text differently which ruinously distorts spacing, condensation and expansion of lines and ruin enlargement and shrinkage of font sizes. .Pdfs are universally viewed accurately with every printer driver. I print my Word texts done with my Laserjet4+ printer driver to .pdfs with Adobe Distiller to enable them to be identically viewed on every computer. Sometimes to do this I have to make a few changes to my text.

At this point I am able to publish on the Web with .pdfs and/or publish in print from .pdfs or Word documents. The large prints on exhibit at COSIGN 2002 were printed by a local printer from the same Microsoft Word generated .pdfs as are seen on the web. The print copy of The Gates Of Paradise was Xeroxed from a 1200 dot per inch Duplex HP Laserjet 4000 TN PCL 6 master.

A fabulous artistic pleasure in .pdfs is the magnifying glass. With the magnifying glass one may enlarge or condense the image. This allows the use of minute font sizes for buried counterpoints, etc. When the fonts are enlarged they become giant sculptural entities which have the capacity to overlap transparently or opaquely. As the reader enlarges or reduces the fonts they create a myriad of object and meaning relationships. I have used over 100 fonts and symbols out of 400 fonts and symbols available to me in my system. I am happy in my use the of the gray scale gradations and colors available for fonts in Microsoft Word.

I wrote the 350+ poems of The Gates Of Paradise in Microsoft Word in 3 hours every morning for 15 years: 5475 days: 16425 hours. Whenever I have shown anyone how I create shape poems they have

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run out of the room. They invariably explain that it disturbs them to see someone working as slowly as I do on a computer:

Each of the over 350 poems of The Gates Of Paradise is an icon of our world, with idea, picture, meter, prose, or melody all shaping each other. The Gates Of Paradise is a poem that exhibits some of the many ways I've seen living and dead human beings struggling to find happiness inside of themselves and outside of them. These gates are paradisiacals of people, and animals, and objects from dancing body parts to Las Vegas lounge singers, from Brooklyn Dodger fans to cyborg Babbits, from nerve wracked saints to Los Angeles bottom feeder rabbits, from lovely air heads to heads of state to heads of lettuce, from black holes to pear shaped planets, with one often transforming into another as the poems proceed.

The Gates Of Paradise are created in the light of, yet unconstrained by, Shape Poems from Technopaegnia of the Greek Anthology**:** Theocritus, Simias, Marcus, Besantinus**:** Persian Garden Rugs, Chinese Phoenix Dragon Writing, Zenga, Hyginus, Herbert, Mallarmé, Chi Pai Shih, Appolinaire, Cocteau, Delaunay-Turk, Marinetti, Lissitzky, Mayakovsky, Hollander, et al. [3] In many of these poems, shape burdens as meter might and counterpoints as meter may. Often the picture is the Shubert sunmelody, the words the buried Verd imosquitogun violins. Often the picture is the Reubens silverfish flesh underpainting, the words the surface Rodin shoepolish. Font is frozen sound. Often the small fonts are the Mozart sungossamer icepeaktink, the huge fonts, the darkling Beethoven avalanchethunder.

Yes**:** Shapes, words, pictures, rhymes, rhythms, ideas, pokes, jokes, folks, hoax, cokes, and yokes all at once-

This poem is a deeply complex work of art, ranging from intricate metaphysical forms to regional dialects, to just plain old fashioned crap. No dimension, or pretense, or any fad of soul crushing iron tedious small mean increment of human training is left unilluminated.

My endeavor in the shadow is to create a light effect that goes down past the walls of habitual prejudice, down past the huge vault of slow incremented little trainings, down to the unhelped hope broken buried human Self, through the scattering of ideas, images, and words, too quick or sad or happy for the merciless dog training to reject. My endeavor in the shadow is to nourish the buried real human inside so that if the buried Self ever arises to take its place in the conscious life, the unbound Self will be strong enough to survive the vicissitudes of our daily life. Part One of the poem**:** The Gates Of Paradise, The Breath Garden Entrance**:** Explores breath**.** Part Two**:** The Flux Garden**:** Explores change. For human beings breath and change are the same. And they are different. The same is the gate.

[1] (http://ublib.buffalo.edu/libraries/units/pl/collections /manuscripts/index.html)

[2] (http://www.rediscov.com/ sackner.htm)

[3] Representative works at www.thegatesofparadise.com
As also is**:** The Gates Of Paradise. (Also at www.ubu.com/) Also see**:** David Daniels' YEARS
1933-2002 at Biographical Notes (www.thegatesofparadise.com/bioNotes.htm)

http:www.madmadmax.com/one_way/

Max Amagliani
Xxxxxxxxxxx Xxxxxxxxxxxxxxxx
Xxxxxxx
XX Xxxxxxxx Xx. #xx
Xxx Xxxx, XX XXXXX
Xxxx: (XXX) XXX XXXX
m.amagliani@pobox.com

ONE WAY

Xx xxxxx xxxxx, xx xxxxxxxx xxx xxxxxxxxxx xxxxxxxxxx xxx XXX XXX Xxxxxxxxxxx.

Breaking Conventional Navigation on the Web

X.X.X [**Xxxxxxxxxxx xxxxxxxxx**]: xxxxxxxx xxxxxxxxxx xxx xxxxxxxx – *xxxxxxxx xxxx xxxxx, xxxxxxxxxxxxx, xxxxxxx xxxxxxxxxx.* Xxxxx xx xxxx xx xxxxxxxx, xxxxxx xxx xxx xxxxxxx xxxxxxxx xxx xxxxxxx xxxxxxxxx xxx xxxx xxxxxxxxxxx.

The ONE WAY Sign Machine

Xxxxx xxxxxxx xxxxx xxxx xx xxx xx xx xxxxxxxxx XX xxxxxxxxxx xxxxx: Xxxxxxxxx, Xxxxxxxxx, Xxxxxxxxxxx, Xxxxxxxxxxx, Xxxxxxxxxx, Xxxxxx, Xxxxxxxxx, Xxxxxxxxxxx, Xxxxxxxxxxxxxxxx, Xxxxxxxx, Xxxxx Xxxxxxx, Xxxxxxxxxxxxxxxx, Xxxxxxxxx, Xxxxxx, Xxxxx Xxxxxxx, Xxxxxxxxxxxxxx.

Shows

Xxxxxxxx xxx xxxx xxx xxxxxxxxxx xxxxxxxx.

1. HOW HUMAN REALITY

Xxx xxxxxxxxxxx xxx xxx xxxxxxx xx xxx xxxxxxxxx. XXX xxxxx xx xxxx xxxxx xxxxxxxxxx xx-xxxxxxxx x xxxxxx, xxxx-xxxxxxx xxxxxxxxx. Xx xx xxxx, xx xxx xxxx xxxxxxx xxxxxx xxxx xxxxxx xxxxxxxxx. Xx xxxxxx, xx xxx xxx xx xxxx xxxx xxxxx xxxx xxxxxxx xxxxx xxxx xxxxxxxx. Xxx xxxxxxx xxx xx xx xxxxx xx xxxxxx xx xxxx-xxxx x xxxxxxxx xxxx [x], xxx xxxxxxx xxx xxxxxxx xxxx xxxx xxx xxxxxxxx.

2. IS CONSTRUCTED ON

Xxx xxxxxxxx xx xxxx xxxx xxxxx xxx xxxxxxx x xxxxxxxxx xx XX x XX.X xx (X" x X.XX"), xxxxxxx xx xx xxxx, xxxxxxxxx X.XX xx (X") xxxxx xxx xxx xx xxx xxxx xxx xxxxxx xxxx X.XX xx (X") xxxx xxx xxxxxx.

3. SHARED PRINCIPLES

3.1 Those Principles become

Xxxxxx xxx x X-xxxxx Xxxxx Xxxxx xxxx, xx xxxxx Xxxxx xxxx xxxx xxxxxx, xx xxxxx xx xxxxxxxx xx xxxxxxxxxx xx Xxxxx Xxxxx xx xxxx xxxxx xxxxxxxxxx xxxx xxxx xxx. Xxx xxxx xx xx xxxx x X-xxxxx xxxxx, xx xxx xxx xxxx. Xxxxxx xxx xxxx-xxxxx xx xxx-xxxxxxxxxxx xxxxx xxxx xxx xxxxxxx xxxxxxx, xxxx xx xxxxxxxxxx xxxxxx xxxx xxxx. Xx Xxxxx Xxxxx xx xxx xxxxxxxxx, xxx xxx xxxx xxxxx Xxxxxxxx Xxxxxx Xxxxx. Xx x Xxxxxxxxx, xxx xxx xxxx xxxxx Xxxxx.

3.2 Our Only

Xxx xxxxx (Xxxxxxxxx XX-xxxxx xxxx), xxxxxx' xxxxx (Xxxxxxxxx XX-xxxxx) xxx xxxxxxxxxxxx (Xxxxxxxxx XX-xxxxx) xxx xxxxxx xxx xxxx xxxxx xx xxx xxxx – xxx xxxxxx xxxx. Xx xxxx xxxxxxxxx xxxxx xxxxxx (Xxxxxxxxx XX-xxxxx) xxx x-xxxx xxxxxxx (Xxxxxxxxx XX-xxxxx). Xxx xxx xxx xx xxxx xxxx xxx xxxxx xxxxxxx. Xx xxxx xxx xxxxxxx xx xxxxxxx, xxxxxxx xxx xxxxxxx xxxx. Xxx xxx xxxxxxxxx, xxx xxx xxxxxxx xxxx, xxx xx xx. Xxx xxxx xxxx.[1]

3.3 Possible Reality

Xxxxxx xxxxx X.XX xx (X.X") xx xxxxx xxxx xxx xx xxx xxxxxx xx xxx xxxx xxxxxx xx xxx xxxxx xxxx xxx xxx xxxxxxxxx xxxxxx.

3.4 The ONE WAY Sign Machine

Xxx xxxxx xxxxx xxxx xxx xxxxx xxxx, xxxxx xx xxx xxx xx xxx xxxx, xxx xxxxxxxx xx xxxxxx-xxxxxx xxxxxx.

Xxxxx X. Xxxxx xxxxxxxx xxxxxx xx xxxxxx xxxxx xxx

Xxxxxxxx	Xxx	Xx-xxxxxxx	Xxxxxx
Xxxxxx	Xxx	Xxxx	Xxxxx
Xxxxxxx	Xxxx	Xxxxxxx	Xxxx xxxx

[1] Xx xxxxxxxxx, xxx xxx xxxxx xxxx xxxxxx xxxx xx x xxxxxxx, xx xx x xxxxx xxxxxxx xx xxx xxx xx xxxx.

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3.5 Is the Symbol of this Process

Xxxxxxxxx xxxxxx xx Xxxxx Xxx Xxxxx X-xxxxx, xxx xxxxxxxxx xx xxx xxxx xxxxx xx xxxxxx.

Xxx xxx xxxxxxxx Xxxxxxxxxxxxx xx xxx XXX xxxxxx xxx xxxxxxxxx – xxxx xx, x xxxxxxxx xxxx xx xxx xxx xx xxx xxxxxxx, xxxxxxx xxxxxxxxxxxxx xx xxxxx xxxxx, xxx xxxxxxxxx xxx xxxxxx xx xxxxxxx [X]. Xxx xxx xxxxxxxx xx xxxxxxxx xx xxx xxx xx xxxx xxxxxxx. Xxxxx xxxx xxxxxxx xxx, xxx xxx xxxxx xxxxx xxxxxxx.

Xxx xxxxxxxx xxx xxxx xx X xx., xxx xxxx xxxxxx (xxx Xxxxxx X) xx xxxxx xxxxx. xxxxxxxx xxxxx xx xxxxxxx xxxxxxxx xxxxxxxxx xx xxx xxxxxx. xxxxxxx xxxxxxxx xxxxxxx xxx xx xxxxx xxxx xx xxxx xxx xxxxxx xxxxxx (x.x. xxx xxx xxxx xxx xxxxxx xx xxxxxx xxx xxxxxx xxxxx xxxx xxxxxxx) xxx xxx xx xxxxxxxx xx xxx xxxxxx. Xxxxxxx xxxxxxxxxxxxx, xxx xxxxxxxxxx (x.x., "[Xxxxxxxxx, xxxxxxxx xxxxxxxxxxxxx]").

3.6 Through This Process We Show

Xx xxx xxxxxxx xxxxxx, xxxxxxx xx xxxx xxxxxxxx xx xxxx xxxxxxxxxx. Xxxxx xxxx xx xxxxxx xxxxx xxx xxxxxxxxxxx xxx.

4. HOW THE REGULATING MACHINE

Xxxxx Xxxxxx/Xxxxxx/Xxxxx xx xxxx xx xxxxx xx xxx xxxxxx xx xxxxxx (xxx Xxxxxx X). Xx xxx xxxxxx xxxxxx xxxx xx xxxxxx xx XX.XX xx (X").

Xxxxxxx xxxxx xx Xxxxx Xxx Xxxxx X-xxxxx xxxx. Xxx xxxx xx xxxxxx (x.x., "Xxxxx X" xx "Xxxxxx X"), xxxx xxxx xxx xxx xxx xxx Xxxxx xxx Xxxxxx xxx xxxxx xxx. Xxxxxx'x xxxxxxx xxxxx xx xxxxxx xxxxxx xxx xxxxx xxx xxxxx, xxx Xxxxx xxxxxx xxxxxx xxx xxxxxxx.

5. BECOMES

Xxx xxxxx xx x xxxxxx xxxx xx xx Xxxxx Xxx Xxxxx XX-xxxxx xxxx xx xxx-xxxxxx xxxx xxxx xxxx xx xxxxx X-xxxxxx xx xxxxx xxxxx xxxxx xxx xxxxxxx xxxx. Xxxxxxxx xxx xxxxxx xxx- xxxxxxx xxxx xx xxxxx xxx xxxx xxxx. Xxx x xxxxx xxxx xxx x xxxx xxxx xxxxxxx (xxxx xx Xxxxxx X xxx xxxxxx X.X), xxx xx xxxx xxxxx.

5.1 The Only

Xxx xxxxxx xx xxxxx xxxxx xx xx Xxxxx Xxx Xxxxx XX-xxxxx xxxx xxxx xxxx xxx xxxxx xxxxxx xxxxxxx. (Xxxx: Xxx xxxxxxx xxx xxxxxxxxx, x xxxx xxxx *xxx* xx *x* xx xxx xxxxx xxxxx xx xx xxx xxxx xxxx xx xxxxx.)

5.1.1 Xxxxxxxxxxxxx

Xxx xxxxx xxx xxxxxxx xxxxx xxx xxx Xxxxx Xxx Xxxx XX-xxxx xxxxx xxx xxxxx xxxx xxxx xxx X-xxxxx xx xxx xxxx xxxx xxx xxxxxxxx xxxxx.

5.1.1.1 Xxxxxxxxxxxxx

Xxx xxxxxxx xxx xxxxxxxx xxxxx xx xx Xxxxx Xxx Xxxxx XX-xxxxx xxxxxx xxxx xxxxx xxxxxx xxxxxxxx.

5.1.1.2 Xxxxxxxxxxxxx

Xxx xxxxxxx xxx xxxxxxxx xxxxx xx xx Xxxxx Xxx Xxxxx XX-xxxxx xxxxxx xxxx xxxxx xxxxxx xxxxxxxx.

6. EXISTING

Xxx xxxxxx xx XXX XXXXXX xxx xxxxxx xx xx xxxxx xxxxxx xxxx xxx xxxxxxxx.

7. REALITY

[1] Xxxxxxx, X.X. Xxxxxx xxxxxx xx xxxxxx: Xxxxx xx xxxxxxx xxxxxx. Xxxxxx Xxxxxx Xxxxxxxx Xxxxxx, X (Xxxxxx XXXX), XXX-XXX.

[2] XXX XXX XXXXXXXXXX xxxxxxxx. xxxx://xxx.xxx.xxx/xxxx/xxxx/xxxxxxx/xxxxxxxx.xxxx.

[3] Xxxxxx., X., xxx Xxxx, X.X. (xxx.). Xxxxx xxx xxxxxxx xxx. Xxxxxx. XXX XX, XX (xxxxxx xxxxx).

[4] Xxxxxxx, X.X. Xxxxx, xxxx xxx xxxxxxx... xx Xxxxxxx xx XXX 'XX (Xxxxxx XX, Xxx XXXX), XXX Xxxxx, XXX-XXXX.

[5] Xxxxxxx, X., xxx Xxxx Xxxx xx Xxxx-Xxxxx Xxxxxxxx. Xxxxxxxxx xxx Xxxx-xxxx Xxxxxxx. Xxxxxxx Xxxxxxxxx Xxxxxx, Xxxxxxxx XX, XXXX.

Where do Virtual Corpses go

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ABSTRACT
This paper will present descriptions and theoretical concerns of mine in relationship to the game development-based visual work I have created during the last three years. These theoretical concerns revolve around issues relevant to contemporary digital art practice and commercial computer game development, as well as personal observations and motivations.

Keywords
Games, game development, game modification, intuitive visual gesture, visual product, mod, patch.

1. INTRODUCTION
My history is up for grabs. I will set up trade alliances, and enter into truces. Or will I just let my Babylonian Bowmen rain terror down on my enemies' heads. I will lead a team of specialists into an abyss of vast caverns, snake-like passageways and luring dead-ends. I will command squads with precision and power using a GPS, night-vision, battlefield computers, and modular body armor. My unique magic system allows me to change the spells and creatures I bring into battle each time. I will stay frosty as the world explodes around me and my mission goals change on the fly. I will customize my squad into specialized experts in snipercraft, demolitions, and stealth. I will tread lightly, the depths belong to twisted cults, mutants, and hideous creatures that were never meant to exist. I will catch all the rip-roaring action from film-quality multiple camera angles: cockpit, chase close, chase far, dash, television camera, sides, front, ground, sliding, and even skycam views. I will plow through snow packed roads, bust out from a wall of fog and be blinded by oncoming rain. All while piloting the most badass 'Mechs ever.[1]

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[1] This statement was created with appropriated and reorganized game magazine advertisements.

2. MAIN TEXT
To begin, I would like to present an image of what could be called "digital folk art". It was scavenged from a web site[2] that held a contest that asked visitors to create a fake screenshot for the upcoming game ***Doom 3***[3].

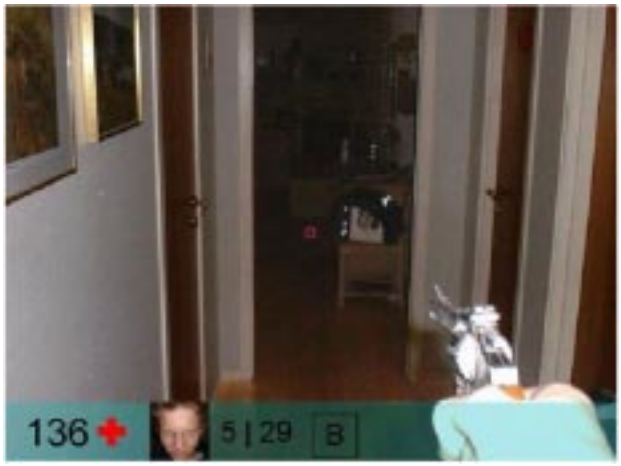

Figure 1: anonymous, 2001
082200_doomfake_30.jpg
digitally manipulated photography

It represents a common intuitive visual gesture among a generation that has grown up with computer games. This gesture is the simple visual juxtaposition of representations (in this case photographs) of objects and people present in the surroundings of the image creator with visual elements common in popular games. Assuming that the face and hands in the picture are those of the artist, the creator of this digital manipulated photographic image has created a visual scenario where the human computer interface present in popular computer game has become has become the interface for his daily life. This new interface serves as a filter to his world. It allows him the freedom to imagine interaction with the real world in a game-like manner. Orthodox American rules of morality do not apply in game space. Considering the image, he can wander the halls of his house with weapons, preparing to kill whatever may pass his way, whether it be his parents, his dog. etc. It is important to remember that this

[2] Shacknews, 2000 www.shacknews.com/screens.x/doom2k/Fake%2520Contest/1/fake.
[3] ID Software, 2002, www.idsoftware.com

is only a representation. It is what I see as a teenager's healthy outlet for frustrations concerning social and domestic constraints. During my own teenage past, I remember sitting in the high school cafeteria, drawing images of mutilation and death. One image consisted of representations of the students that were higher in the social ladder than I, slumped over the tables with shotgun blasts in the back of their head.

First person shooter games did not exist at that time. If they did, and I had access to Photoshop, I am sure that I would have been creating images not unlike this one. To some extent that teenager, the one who made this image, and the one who I was, are my intended audience.

The first of a series of visual products I would like to discuss is ***Adam Killer*, (1999-2001)**. ***Adam Killer*** is a series of eight conversions of the popular first person shooter game ***Half-Life***[4]. Computer game conversions are known in the game development industry as "mods". According to artist/curator Anne Marie Shleiner, a "mod" or "patch" can be described in the following manner:

"Beginning with add-on levels for bloodthirsty first person shooters a new kind of popular art form has emerged on the Internet that fuses the tactics of the hacker with the sensibility of the avid gamer. A patch (or a skin, a wad, a mod, a map or a shape) is an add-on to an existing game engine that alters the original code or state of a computer game. A patch can range from a simple repair of an error in the original game to elaborate manipulation and customizing of graphics, sound, game play, physics, code, architecture or other attributes of the original computer game."[5]

Figure2: Brody Condon, 1999-2001
Adam Killer: Machine Gun
Computer Game Conversion

In ***Adam Killer***, my modifications included creation of the environment the player moves through, otherwise known as a "level", as well as the creation of the 3d character model Adam. The player/performer navigated through the game "level" filled with multiple copies of the same Adam character standing "idle" on a white plane. I chose an acquaintance named Adam Frelin as a model for the character specifically because he commonly wore white clothing. White was an aesthetic decision, I felt it visually contrasted well with blood. As the characters were shot and bludgeoned with various weapons, an exploited glitch in the game's level editing software[6] created a harsh trailing effect. This turned the environment into a chaotic mess of bloody, fractured textures.

In April 1999, in the now famous Columbine incident, two teenagers stormed their high school with assault weapons and killed several of their fellow students and wounded many others. Their actions, weapons, and speech mimicked elements from popular computer games.

Figure 3: Brody Condon, 1999-2001
Adam Killer: Shotgun
Computer Game Conversion

"It's going to be like fucking Doom. Tick, tick, tick, tick Hah! That fucking shotgun is straight out of Doom!" [7]

The two teenagers responsible for the murders of their classmates *performed* what the anonymous creator of the fake screenshot *represented* in his image. The two actions – the creation of the image, and the murder in a high school – are also opposites of the same action; the simple juxtaposition of game space and real space. If the former action was the mixture of game elements and real representations in game space, the latter was a mixture, or a "mapping", of game elements and real elements in real space. One simply requires a different set of circumstances and sociopathic tendencies.

Adam Killer was the third and most successful in a series of intuitive attempts at game modification that turned out to be very

[4] Valve Software, 1998 www.valvesoftware.com

[5] Anne Marie Schleiner, 1998
Parasitic Interventions: Computer Games as Hacker Art
www.opensorcery.net

[6] At the time of this paper, shareware called *Worldcraft* was the standard level editor for *Half-Life*

[7] Eric Harris, From a videotape made right before April 1999

similar in structure to the fake screenshot image. It was a simple placement of photography of real elements, in this case the character Adam, into a computer game environment.

This placement begins to question the separation between the two worlds, and lays bare the effects of interactive media saturation on American youth culture.

In ***Adam Killer***, there is also the added element of formal exploration of game development technologies such as C++ code, digital images, and polygonal 3d models as a medium. The type of exploration of these technologies that most interests me are those that deconstruct the visuals of the game in a post-psychadelic manner. Many of these visual products have ties to contemporary club culture.

Here, I am specifically referring to conversions of the RC racer game ***RC Re-volt***[8] by Retroyou from Barcelona like ***Retroyou*** r/c, (2001)[9].

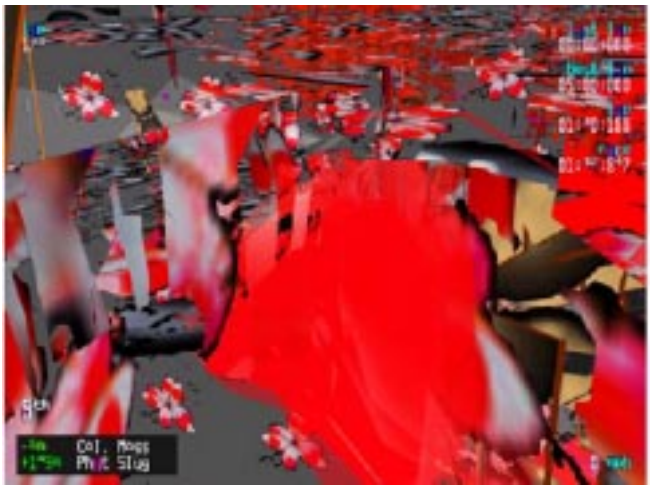

Figure 4 : Retroyou, 2001
Retroyou r/c
Computer Game Conversion

This type of work is fairly common, and represents an ongoing visual dialogue concerning attempts to deconstruct drivers, hardware, and game engine code. This dialogue occurs through a loose network of web exhibitions like www.selectparks.net, workshops, club events, and online forums like www.rhizome.org. Other artists, such as Beige[10], are mixing this kind of hardware and software deconstruction with nostalgia by digging into older generation game platforms like the Atari 2600 and the original Nintendo. My current addition to this dialogue is c0a0, (2002), a deconstruction of the intro sequence for Half-Life. The name of the original file which holds the intro sequence environment is c0a0.bsp. I have also created several levels to take advantage of the code changes. The most famous glitch that several of these formal deconstructions use is the "leak". Due to the early limitations of 3d game engine technology, 3d games started as enclosed mazes. Every piece of a game "level" that the player could inhabit must be enclosed by 3d geometry. The "leaks" are parts of a level left open. With no texture or geometry to render, the computer hardware and drivers are confused about what to represent on the screen. This creates the harsh trailing effect exploited in ***Adam Killer*** and ***c0a0***.

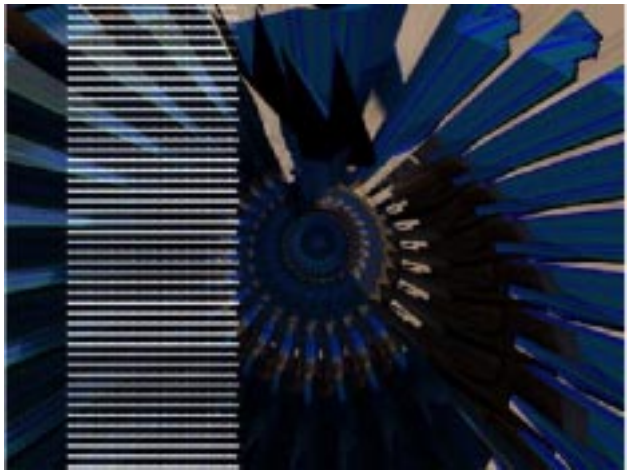

Figure5: Brody Condon, 2002
c0a0
Computer Game Conversion

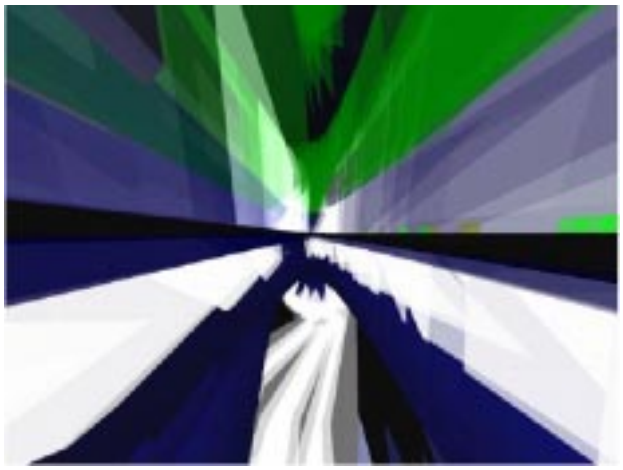

Figure 6: Brody Condon, 2002
c0a0:Blue Room
Computer Game Conversion

In previous work, I took a different approach to this series of game development work. One that has evolved from the history

8Acclaim, RC Re-volt, 2000 www.acclaim.com/games/re-volt/gameinfo.html

9 Retroyou, www.retroyou.org/retroyou_RC_full_radioControl/reVision_why.htm

10 Beige Programming Ensemble, Fat Bits, 2001 Looping real-time animations generated from re-programmed 8-Bit Nintendo cartridges www.beigerecords.com/cory/make-world/info.html

of performance art. Interventions within online game space have become a common practice for artists. This strategy allows artists the freedom to experiment with the social spaces created by online gaming, and allows the artist to quickly investigate other issues that relate to gaming and culture without having to learn the complex technology it takes to build a game.

Worship* (2002)** is an intervention within the massively multi player online role-playing game ***Anarchy Online[11]. To create ***Worship***, I chose one of several preset avatar animations or "emotes" that are available to player characters: the worship.

Figure 7: Brody Condon, 2001
Worship: Syluus
Online Game Performance

I arranged the avatar that *I* was projecting myself in such a way so that it faced out of the screen towards my physical self. I then triggered a short script or text document with code instructions, a common practice in the game called a "macro" to make the character quickly perform a series of actions. It made my character repeatedly perform a worship animation. I then continuously typed, "I worship you.", and followed it with, "Worship me." This action created a emotionally compelling loop in which the character that I was projecting myself into was worshipping me, and was also asking me to worship it.

At the same time, I was typing, so I was telling the avatar I worshiped it, as well as asking it to worship me. In this strange ritual I was unsure exactly which manifestation of my identity was worshipping, as well as what it is worshipping. The performance became a strange division of self, destabilizing my identity. Worship and ritual are one place where we stabilize our identity by placing it in relationship to the rest of the world, and especially to an unknown which is considered by some the "ultimate truth". I have documented ***Worship*** with several different avatars in an attempt to create more visual interest. Issues surrounding the avatar and identity have been well played out, but I feel it is necessary for me to add to the dialogue. The relationship between my physical self and the representation on the screen that I project myself into is a symbiotic one. The actual presence being something new, somewhere in between.

It is important to note that the computer games that I modify or intervene within are games that I am playing at the time. During play, I begin to notice places where I can use that game for another purpose. ***Gunship Ready*, (2001)** is documentation of a series of five interventions within the first person online shooter ***Tribes 2***[12].

Figure 8: Brody Condon, 2001
Gunship Ready
Online Game Performance

Normal game play consists of two sides of thirty people controlling one warrior each connected to the same server. The two sides battle for control of flags at two bases. My collaborator, John Brennan (aka BigJB) and I (aka Sylo), piloted a transport ship which kidnapped warriors and took them on a tour of the landscape far away from the battle. Eventually the kidnapped victims realized their fate. They could not get back to the battle site unless they died and were "respawned". The result is the characters were all forced to commit suicide (ctrl-k).

The "respawn" is a common phenomenon in computer games. It is closely related to the idea of reincarnation or ressurection. It is a familiar convention that game play is started and played until an event causes the player character to "die" or lose. If lost, the game restarts, either at the beginning of play, or at some point near where the player was before he/she was unable to successfully progress in the game narrative. The term "respawn" is used specifically in arena based online multiplayer games like ***Quake 3: Arena***[13] where the fighting goes on continuously by opponents randomly joining and leaving at random intervals. The goal is to have the highest score gained from killing opponents. When the representation of the warrior that the player projects

[11] FunCom, 2001 www.anarchy-online.com

[12] Sierra, 2001 http://tribes2.sierra.com/

[13] ID Software, 1997 www.idsoftware.com

himself into is reduced to negative "health", that player is considered dead, and then is "respawned" somewhere else in the fighting arena. Due to this fact, death takes on a new experience. It is physically painless, and you are immediately resurrected. Also, in many games, key commands to commit suicide are built into the game structure, and are equally without much consequence.

Figure 9: Brody Condon, 2001
Gunship Ready
Online Game Performance

It is exactly this change in the value of death in the game space that I am interested in. If Adam Killer was an exploration of the value of death enacted on characters and avatars other than the game player, *Gunship Ready* is an investigation of the value placed on the player's own character. The intensity of the loss of the value of death regarding suicide becomes apparent in the following example from the documentation. QuandaryOne, a *Tribes 2* player, asks for assistance finding the suicide command, is helped, and responds in the chat window with a, "Thanks!", immediately after shooting himself in the head. *Gunship Ready* is an attempt to exploit the boundaries of the game to control the screen of other online players. It is interesting that this trespass on the sense of place of the kidnapped player crosses the line of proper game etiquette, but it seems natural for the players to commit suicide on a regular basis.

I would like to propose a ludicrous prophecy. The day will arrive that we as humans transcend our current consciousness, and realize the cycle of reincarnation that our lives happen to take. Realizing this, what will be the value of death? Will we happily shoot, bomb, crush, push over a cliff, or "frag" our friends for fun with a smile and a hearty, "See you in the next life."?

Perhaps the most recent ultimate juxtaposition of game space onto real space has turned out to be the computer game *The Sims*[14] by Will Wright with Maxis. The game is a suburban domestic simulation. According to the creators of the game, it's design was based on the structure of the doll house. It was conceived of as a personal narrative generator for the consumer. Game play begins with the menu based creation of family members and a modest suburban home. The player is then enticed to control the character's everyday domestic actions: cooking, cleaning, getting a job, and going to the bathroom, etc.

White_Picnic_Glitch, (2001) is my series of twelve conversions of *The Sims*. The series is broken up into three thematic sets: White, Picnic, and Glitch. Each set has four pieces that have a duration of approximately three minutes each. Each section portrays aesthetically mutilated characters performing repetitive, useless, or indiscernible actions. The characters inhabit neighborhoods like White, which consist of sparse white spaces and grids. Those of Picnic are placed in a bucolic canyon park setting. The environments of Glitch are fractured, nonrepresentational spaces.

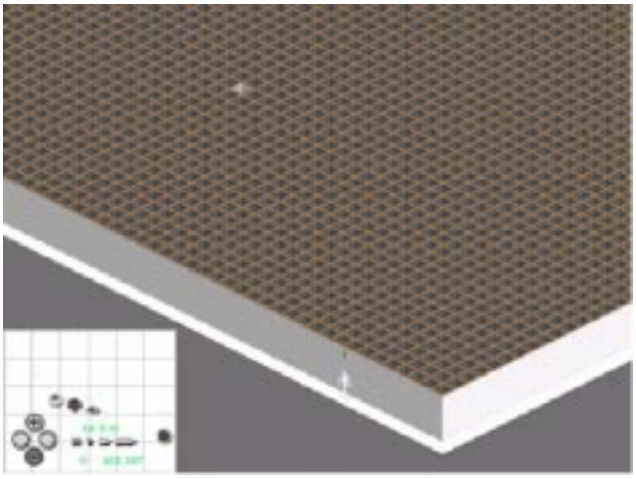

Figure 10: Brody Condon, 2001
White_Picnic_Glitch:
Man Outside Grid
Computer Game Conversion

[14] Wright and Maxis, 2001 http://thesims.ea.com

Figure11: Brody Condon, 2001
White_Picnic_Glitch: Canyon BBQ
Computer Game Conversion

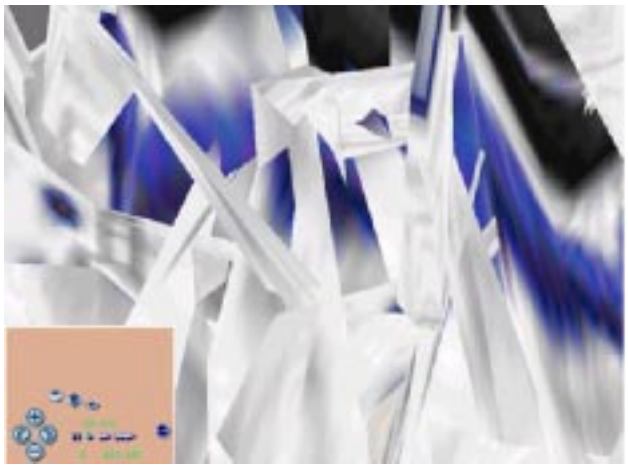

Figure 12: Brody Condon, 2001
White_Picnic_Glitch:
Self Portrait with Flowers 3
Computer Game Conversion

Due to the nature of the game, the work is somewhere between a game modification and a game intervention. In some of the series I am constructing dysfunctional narratives; something the average consumer has done already[15]. I enjoy this play in the work being somewhere between fan art and a traditional visuals arts product. In others parts in the series, I am reorganizing hexadecimal code, creating objects and animations, and altering 3d meshes to create twitching, fractured characters which fill the game space; technical skills beyond the realm of the normal consumer.

All of these works have led up to my most current project: ***Chinatown,* (2002)**.

Brody Condon, 2002
With assistance of Eric Cho and Sky Frostenson
Chinatown
Computer Game Conversion

Chinatown was conceived as a site specific multi-player modification for the exhibition space Clevel in Los Angeles. C-level is located in the Chung King Road area of Los Angeles's Chinatown gallery district. In the past five years, several galleries that show mostly emerging artists have sprouted in the area. ***Chinatown*** is a simple juxtaposition of several elements. It is an evolution of my in-game portraiture that began with ***Adam Killer***. It is also an evolution of my twitchy animation and dysfunctional AI experiments that began with ***White_Picnic_Glitch***. It is also a comment upon the current gentrification process in the area, as well an attempt to understand the trauma and cultural change of the area's past. It is the most recent evolution of my experiments in the juxtaposition of real space and game space, and an emotional reaction to the site. The Chinatown gallery environment is a place the young artists wish to be a part of,but at the same time it holds the inescapable nature of art as business and relentless networking.

This ambitious project needed the help of two assistants, Sky Frostenson and Eric Cho, which was a necessary learning experience for me in the role of project superior. As my projects begin to get larger, I have begun to adopt the production strategies of game development companies. Organizing tasks and files for me and the assistants became a major learning process.

Chinatown is a game that is not player controlled, rather, all interactivity is internal and randomly controlled by "bots". These artificially intelligent "bots" also function as portraits of friends as they aimlessly wander around the game space twitching. The piece can be set up as a two PC local area network, one runs the server, and one runs the projector output.

[15] The Sims was based on the model of the dollhouse. Many of these consumer driven narratives are documented in web scrapbooks. http://thesims.ea.com/us/index.

Figure 13: Brody Condon, 2002
With assistance of Eric Cho and Sky Frostenson
Chinatown
Computer Game Conversion

Figure 14: Brody Condon, 2002
With assistance of Eric Cho and Sky Frostenson
Chinatown
Computer Game Conversion

It can also be set up with several machines, the other machines are for the audience to look through the eyes of the bots if they wish. The user can look around as the bot moves, but not effect its movement. The technology that I manipulated in Chinatown to allow spectators to view the internal artificially intelligent bot interaction was coined "Multicast Spectator Tech" by Valve's project leader Erik Johnson:

"The Multicast Spectator Mode is designed to allow thousands, if not millions, to watch a single multiplayer match," explains Johnson.

"Spectators can access a single game, giving them the opportunity to learn gameplay elements, study individual and team strategies, or simply enjoy the action." [16]

As mentioned before, ***Chinatown*** viewers can only interact with the game in this "spectator mode". Much in the same way the Chung King gallery visitor can only operate in a mode of spectatorship. In game space, the galleries in the area have been removed. This can be seen as a gesture to return the area to its pre or post-galleried state. I have also taken the meditative, stereotypical Chinese music and random sounds from the area to map the sound of the real space into game space as well.

It is important to note the experiential component that all of these elements created. The viewer experienced the movement from the actual crowded Chung Kind Road area to the calm, dark C-level exhibition space dominated by a projection of the game representation of the area. This type of experiential site specific installation structure is an important component that has carried over from my performative sculptural installation work from before 1999.

In each of these works, I have invested myself in the creation of alternative possibilities for game development technology beyond the commercial sphere. Each piece is a meditation on a different manifestation of dysfunction and its relationship to a contemporary culture that is becoming dependent on interactive screen based representations of its environment.

[16] James Ham, 2001. Gamespy.com article on multicast technology. http://gamespy.com/articles/june01/