



Deliverable 4.2

Artistic concepts and production in extended performance

ABSTRACT

The work presented in this report explores artistic concepts which consider multi-user virtual reality, tele-presence and augmented reality as appropriate means for developing a concept of extended performance combining VR media with performing and plastic arts. This investigation has been carried out via targeted workshops and competitions organised by GMD and ZKM, challenging persons from artistic and technical disciplines to build new visions of interactive concepts in performative shared and mixed reality environments. The events described in this paper are as follows :

- Virtual Stages Workshop, GMD (February 6-7, 1998)
- Cyberstar competition on new interactive concepts and shared visions, GMD (April-June, 1998)
- Seminar "Own bodies, other bodies, virtual bodies", ZKM / IIM (International Institute of Puppetry), Charleville-Mezieres, France (June 6-7, 1998)
- Workshop Real Gestures, "Virtual Environments", ZKM/ IIM (August 4-16, 1998)

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Artistic Concepts and Production

The work presented in this report is concerned with exploring artistic concepts which consider multi-user virtual reality, tele-presence and augmented reality as appropriate means for developing a concept of extended performance combining new VR media with performing and plastic arts. This investigation has been carried out via targeted workshops and competitions challenging artists, performers, scientists and professionals in these fields to contribute to new visions of interactive concepts in performative shared and mixed reality environments. These events are as follows :

- Virtual Stages Workshop, GMD (February 6-7, 1998)
- Cyberstar competition on new interactive concepts and shared visions, GMD (April-June 1998)
- Seminar "Own bodies, other bodies, virtual bodies", ZKM/ IIM (International Institute of Puppetry), Charleville-Mezieres, France (June 6-7, 1998)
- Workshop „Real Gestures, Virtual Environments“, ZKM/ IIM (August 4-16, 1998)

These activities, their respective contexts, research findings, and implications are presented as two separate sections in this report. The GMD chapter deals foremost with the concept of virtual stages and the Cyberstar competition for new interactive concepts and shared visions. The ZKM paper focuses on presenting the experimental context for the upcoming erena performance seminar and workshop, organized by the ZKM and the International Puppetry Institute in Charleville-Mezieres, France. The two contributions help chart out two very distinctive approaches to the concept of extended performance.

In the ZKM chapter, the artists as the actual performers are the centre of attention. The threefold stage-actor-audience structure is extended by involving the connection actors-"machines" in order to explore the possibilities of extending their acting with the new technology. Here, the notion of extended performance is not directly related to the audience but rather to finding new ways of combining human performers and complex machinery, thus moving towards the notion of a hybrid performer. Within this line of research, it may even be conceivable for the machine performer to take over the central role (as in the described IMUTE experimental configuration, staged last September in Italy).

The GMD contribution exemplifies another approach in which the artists create a framework for the audience that itself gets transformed to "players" - active participants who themselves determine the time and the interpretation of the play. In the centre of interactive works is the unconscious player. Presented examples of interactive art thematise the notion of tele-presence or the play with dynamic, responsive imagery, that often depict/mirror/represent the observer himself. They provide an extended setting in which the popular everyday appearances - the "I" - are addressed. The setting, the stage and the story play a decisive role in the invitation to communication.

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1. Introduction

The work is concerned with exploring artistic concepts which consider multi-user virtual reality, tele-presence and augmented reality as appropriate means for developing a concept of extended performance combining new VR media with performing and plastic arts. The method is through targeted workshops and competitions challenging artists, performers, scientists and professionals in these fields to give their contributions to new visions of interactive concepts in performative shared and mixed reality environments. Work at GMD has encompassed:

- Virtual Stages Workshop, at GMD (February 6 to February 7, 1998)
- Cyberstar competition on new interactive concepts and shared visions (April-June '98)

In this chapter we describe these activities and present their results and our research findings as followups to these activities. We also present two viable examples of artistic concepts as illustrations for possible realizations of specific demonstrators: Paul Sermon's "Telematic Vision", Simon Penny's "TRACES" and other artistic concepts of extended performance. Each of these examples illustrates artistic approaches to interactive concepts using different VR media such as mixed reality environments, tele-presence systems, connected CAVEs.

2.0 Virtual Stages

In this chapter the concept of virtual stages is treated in three ways:

- concrete artistic approaches in the development of the concept of virtual stages,
- structure of virtual stage installations and performances,
- implications of the concept of virtual stages at the level of psycho-technological transformations.

As an introduction to dealing with the concept of virtual stages, some of the experiences and points of departure from the artistic work of Fleischmann&Strauss are presented. Next, structural aspects are discussed. Finally, some implications of the concept of virtual stages are treated in a contribution by Derrick de Kerckhove on "Externalizing Consciousness".

Derrick de Kerckhove director of the McLuhan Program at the University of Toronto was invited to comment on the work on extended performance done at the GMD during the last 5 years. His work is encouraging and vitalising for the discussion about today's topics in connected virtual communities. These thoughts have been of great importance for the Virtual Stages workshop.

2.1 Virtual Stages: Workshop at GMD, Sankt Augustin Feb. 6-7. 1998

To discuss the notion of Virtual Stage and Extended Performance theoretically we invited 25 students of theatre theory from the FU Berlin with their teacher Ulrike Hass. Other participants were artists and scientist from GMD and Rebecca Picht from ZKM who was one of the producers of the ZKM media museums CD-ROM which was seen by us as a Virtual Stage itself.

Several interactive installations - all exhibited at the ZKM Media Museum - were discussed as examples of Virtual Stage environments. Presenters were Rebecca Picht from ZKM, Ulrike Hass, from FU Berlin and Monika Fleischmann from GMD.

2.2 The space as stage setting - playing with reality

Interactive works recount stories in space. It is here unimportant whether the story as such is recognised. What is of importance is that the visitor finds a thread that stirs memories inside of him. Three elements determine the structure - the spectator, the story and the space. The area of conflict is the relationship that exists between man and his world of experience.

The immersion into a story which is presented virtually and interactively as a framework for human actions has a fundamentally different purpose than film or theatre. The basic form of the theatre is dialogue and contemplation of the various ways of thinking and behaving. Film is the modern form of dramatic art and represents a progression from the static image to the moving one.

Interactive media art has the task of bringing the qualities of the theatre and film into confrontation and of intermeshing these qualities. The audience is given an unusual responsibility in this regard. They play a role in the story and have to develop this role themselves in this game of illusion.

But what becomes of man in this staged world? How can he become part of it? What form of dialogue will he develop through interactive digital communication? How is the virtual space shaped by human intervention and what stories are told by man and space?

It is not just that the scenarios that are virtual, the settings themselves also change. Corresponding sounds generated by body movements give rise to foreign body gestures and choreographies. The unusual arrangement of audience and performers in virtual stages creates a state of confusion and uncertainty.

During the workshop following topics were taken as points of departure for the discussion:

Interactivity:

The author/director of an interactive installation provides the space of action and representation as a framework for the participant. Through this set-up the author/director produces a more or less sophisticated choreography which determines the internal framework for the participants.

A strict action-process whether intrusive or obscure will control the participant as an agent for an invisible program. As the participant learns the rules of the set-up he/she becomes able to

control the concept. Conversely a free relationship between action and scene defines the participant as a character who in turn produces new emphasis's in the handling of the virtual stage.

Context:

Interactive installations are often complex shapes. The topics that they investigate are about our selves as active beings in a relationship to a world which change through our manipulation. They receive a special character through the overlay of the personal language of the author/director and otherwise separate systems of representation and interaction.

When exhibited in the ZKM media museum the interactive installations are put into context with traditional art. It is fundamental to the understanding of installation work that they are part of this history as well of that of a more general history of perception and communication. Interactive installations relate both to the history of optical instruments as well as that of architecture and the perception of self in space.

Technology:

The director of an interactive installation has a vast repertoire of elements for the organisation of the stage at hand. In addition to the physical environment - the real setting - the director makes use of real-time interactive audio, video or computer generated environments. Through the blend of intermedia and real space the author/director manipulates the presented scene.

The intermedia elements allow for the scene to be interacted with. The spectator becomes a participant as he/she intervenes with the event via interfaces. The control and overlay of the scenery becomes possible through the coupling of information databases and dynamic programming.

Space:

Interactive installations are bound to the space in which they are installed. By setting up very precise relationships to the real space the author/director selects a distinct context in which the work exists. Many installations exist in a clearly defined space - black boxes - which isolate the work away from coincidental associations. This is on one hand often due to poor projection technology while on the other hand it is used to produce a desired illusionary effect of immersion.

This tendency to isolate and darken the space of the installation is reminiscent of theatre space as well as cinema and the early panoramic buildings. Here in the lack of context it is interesting to find a tendency of architectural or illusionary strategies for the simulation of the missing environment.

Many concepts of virtual worlds have total immersion as a goal. Total immersion is the complete faultless illusion of an environment. This illusion depends on the relationship between space and immersed space.

Time:

The director of an interactive installation gives the action its own time frame defined by the interactive elements. The proper time relationships of the media whether image, video or sound involves the installation space producing a new time dependent experience for the participant.

Participation:

Interactive installations are dependent on audience participation. As an audience forms, the participants change role from active role player to commentating chorus.

The changing creation of actors as active participants, commentators and spectators is typical in the context of interactive installations. It is this change from an observational point of view to a interacting role within the scene which delineates the development of a dramatisation and produces a dynamic in the interactive audience.

The first participant moves blindly without the voyeurs knowledge. As he/she retracts back into the crowd it is with a intimate experience which differentiates him from the rest of the audience. It is the change within the participants perception - from ignorance to expertise - and the forming of small specialised groups within the audience which is of social interest.

Special focus in the Virtual Stages workshop discussion was given to the following works:

- 1.) Jeffrey Shaw's Virtual Museum was discussed as an example for the extension of space, overlaying the actors experience with the real and virtual space (see: Task 4.1),
- 2.) Agnes Hegedues' Memory Theatre VR allows the viewer to explore four different virtual worlds within the framework of one physical space (see: Task: 4.1),
- 3.) Monika Fleischmann & Wolfgang Strauss' Liquid Views & Rigid Waves draws the participant into a role of active looking and haptic control.

2.2.1 Liquid Views - the virtual mirror of Narcissus

The central theme of "Liquid Views" is the well in which Narcissus discovers his reflection. He initially sees water as someone else, as another body. Like the small child in the various "mirror stages" described by Lacan, he decides to recognise his fictive body as himself. This installation has the objective of arousing the observer's curiosity and seducing him to undertake actions that bring him into contact with his senses.

There are no written instructions of the keys to be pressed - as is often the case with computer installations. Instead of pressing keys and buttons, the observer must experiment with his own sense of touch. What is difficult about this is that the visitor is normally prohibited from touching exhibition pieces. A disused underground station under the Madrid Opera House is therefore a far more suitable location for the exhibition than a traditional museum.

Attracted by the sounds of water and a room of shimmering lights, the visitor approach the virtual well. Seeing the image of himself he is tempted to touch it. Touching the image with his fingertip, the image in the water breaks up. Drawn by the sensation triggered by touching his own image in the water, the observer immerses himself in the situation. Liquid Views is

also a metaphor for the Internet: while the person becomes lost in his own actions, he leaves traces behind and is monitored.



Fig. 1: Liquid Views

2.2.2 Rigid Waves - approaching one's "self"

"Rigid Waves" transforms the acoustic mirroring of Narcissus and Echo into visual form. Narcissus gives up his body to his mirror image. The "self" becomes another body. His own movements are only an illusory echo. As the observer approaches the mirror, he is confronted with a mirror image that does not correspond to his normal perception of things.

He sees himself as an impression, as a body with strangely displaced movement sequences and, ultimately, as an image in the mirror that smashes as soon as he comes too close. He is unable to touch himself. A small camera hidden in the picture frame is used to place the observer in the image. The computer-controlled projection surface is controlled by an algorithm that calculates the distance to the observer.

"Rigid Waves" is a virtual mirror which does not reflect but rather recognises. Sight and movement, approaching and distance are triggers for the unusual images. This is an attempt to see oneself from the outside, to stand side by side with oneself and to discover other, hidden "selves". In this fractured mirror, we are able to find ourselves, our "self" has been liberated. But how will I ever recognise myself again?

The two works "Liquid Views" and "Rigid Waves" break entirely new ground in the field of unsharp interfaces and virtual reality. Visitors find themselves wanting to touch the surface of the water or to alter things by changing the mirror image of themselves. These are reactions which make sense. The interface is not interpreted as such. It goes unnoticed and is not consciously perceived.

These natural references turn Liquid Views and Rigid Waves into virtual reality. The interactive behaviour of the observer as it is observed in the exhibition process is an integral part of the work and will find its way into new concepts.

The art educationalist Christoph Liesendahl gives his impression of the two works in the following manner:

"While the water in "Liquid Views" seduces the observer and draws him into its depths, visitors to the "Rigid Waves" work are afraid of the faceted image they see before them. Both works confront the observer with himself in different ways and examine how we react to our quickly changing surroundings. The body becomes an interface to a spatial experience in a virtual reality where it can itself determine how things are observed and the speed of the spatial experience itself. In doing so, it learns to stem off the flood of data and yet to play a role in the world of the telepresence."

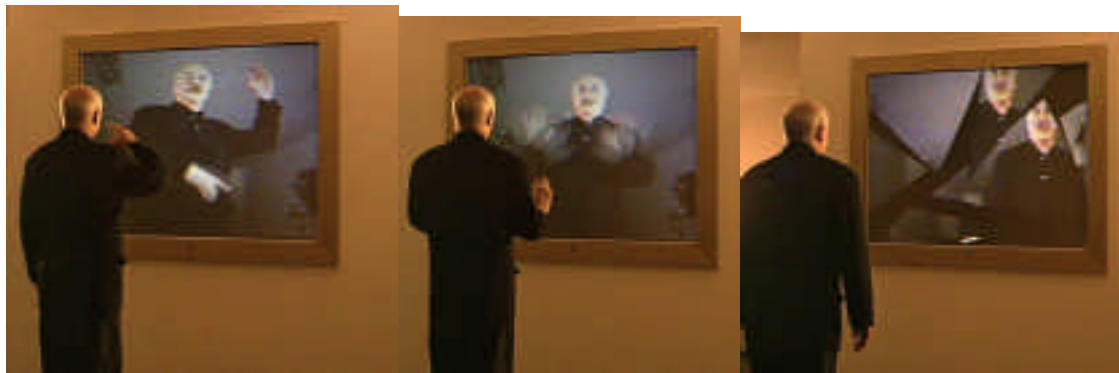


Fig.2: Rigid Waves

2.3. Derrick de Kerckhove: Externalizing Consciousness

The shape of consciousness

In many ways, it seems as if the purpose of so much of today's media development is not only to converge on and off line, but to emerge as the content and perhaps even the form of private consciousness connecting to private consciousness and multiplying thereby.

Imagination, like calculation, is a mental skill. It is one among many that have been subjected to a constant process of externalization, first on a screen, all the way from TV to multi-media, now in the screen with goggles and CAVEs (Computer-Automated-Virtual Environment).

As the contents and the processes of our minds are being poured into these technologies, it is a good thing to have artists take the responsibility to explore the consequences. If the electronic technologies are like the literate mechanical ones which preceded them, then it is likely that they will be or already taking us through several stages of psycho-technological transformations.

Externalization

The first is externalization. The Greek invented theatre to externalize the psychological effects of the alphabet, thereby showing a model of a private mind and its content, the drama of life lived at the symbolical level. McLuhan suggested that if electronic technologies were but extensions (externalizations) of our nervous system, it would be "but a small step to add consciousness", thereby predicting virtual reality.

There is an unconscious demand latent in the externalization of our mental skills, it is that they afford us the same level of freedom that we obtain in the privacy of our own imaginings. About, Home of the Brain, Fleischmann and Strauss say:

While the observer is only the onlooker, this "looking" is a kind of movement. It embodies "active observation". From a certain moment when the observer becomes immersed in the action, his "passive onlooking" is replaced by "active observation". The observer discovers that he - and not the artist - is the one creating the situation. When the situation changes and

the observer becomes a player, he suddenly begins to identify himself with the situation. Observation becomes more than merely consumption. In this moment consumption ceases.

This is all the more true in interactive scenarios when the observer participates in the play and can intervene with it. With virtual reality goggles and gloves, the body is exposed to new spatial experiences. The body is the interface between the interior and the exterior, between reality and virtual reality.

One of the major psychological changes attending the virtualization of human experience is the change of direction of our mind's eye from within the private mind of the reader to the body of anyone interacting with anything. The virtual in that sense is no different than cinema or television, but it puts an extra demand on the technology that it be "real-time", that is that it respond as quickly to the hand as the mind responds to the thought, with the same level of pertinence.

The externalization of consciousness requires more rather than less bodily interaction with the contents of imagination now outside the brain. As Fleischmann and Strauss vigorously emphasize:

We are turning the theory on its head that man is losing his body to technology. In our opinion, the interactive media are supporting the multisensory mechanisms of the body and are thus extending man's space for play and action.

The body, indeed, is a reality that Fleischmann and Strauss understand far better than the endless succession of those sour critics who claim that the technology is robbing us of everything from our body to our minds to our very existence.

Contrary to most critics and opinion-makers, Fleischmann and Strauss believe that the virtual is not here to replace the "real", nor to displace "the body", but to augment both and restore our senses, the first of which is the sense of balance.

Materialization

The second stage is materialization. Our thoughts and the shape of the consciousness that shapes them eventually becomes projected in the concrete reality of physical space. But it takes time. In the old greco-roman culture, it took several hundred years before formal architecture, say that of the theatre or the school or the private house, matured into the material reflection of the typical western -alphabetic- mode of consciousness. The same mode and its many forms that we gleefully retrieved with print technologies in the Renaissance.

The materiality of our sensory lives now requires from digital technology something more concrete than what we can imagine in our minds. It may be that, in order to become really useful, virtuality will need some form of permanence or at least some measure of reliability, as we can see develop in the virtual worlds on line now growing on the Internet. Thus the architecture of the Internet could perhaps be described as a kind of materialization of the digital.

We talk about the digital as if it were truly "immaterial". That is about as clever as our common sense pretend that the air is "empty", or that space is "neutral", or the medieval assumption that "nature abhors vacuum". There is little that is not material in digital stuff. It goes through hardware and responds to the laws of physics and it effects matter.

Internalization

The third, and perhaps the last stage, is internalization. This one is clearly evident in the silent reading of our novels for which we simply internalize the theatrical stage of what we see in real life. We rebuild in the privacy of our mind the gestures and stories of the characters we read about. The question addressed by Fleischmann and Strauss is what do we interiorize and how do we internalize it from the experience of interactivity ?

This is a tough one but we see the beginning of an answer in *Liquid Views* and *Rigid Waves*, two interactive pieces which probe the sense of one's self. We have a self that we have inherited from the alphabetic culture. It was severely threatened by TV, but beefed up by the PC.

The question is what does that self become in interaction, not with machines alone, but with people via machines ? The self in *Liquid View* is not threatened by digitization, only reflected by yet another type of lens.

In many ways, one could claim that all these powers at the tip of our fingers, in the movement of our hips, actually augment rather than diminish the self. The new problematic of self is not that it is vanishing, but rather it is that it is finally approaching a radically new situation, that of potentially combining with other selves, not in amorous but perceptual, cognitive and perhaps even emotional associations.

For example, the fact that whatever is externalized in virtual environments is shareable, gives a new, rather ambiguous status to the self. Two or more people can take part in VR. That makes each one incompletely subjective and incompletely objective. Thus, there is no longer a clear distinction between the extensions of the selves thus extended and outered.

Another example is when any number of people share a realtime virtual world on-line. Each one has a private point-of-view but this POV relates to a single common environment showing up on a screen which is in the same focal position for everybody.

Is that a "common mind" ? A common imagination ? What exactly remains of "my mind" in the moment of attention to that screen ?

Something like a form or many forms of shared consciousness must be positioned at some point in the artistic reflexion. It may be that, in some remote time, what we call today "extra-sensorial perception" will become common sense.

"We are developing a photographic pattern of thinking".

Fleischmann and Strauss question the spatial constraints of the legacy of the Renaissance as well as the divine right of the self. Both space and self are concurrent and collaborative forms of mental representation, part and parcel of the typically western psycho-sensorial synthesis. The self positions itself by reference to a 3-D reality.

However, while conventional perspective and *trompe-l'oeil* as well as holography today always kept the self away from the spectacle (*trompe-l'oeil* means to "fool the eye" into believing that it can appreciate the depth of a 2-D representation without the need to touch the painting), VR and all interactivity involve the self, suck it in the spectacle and into action, so to speak. Virtual Reality is an excellent technology to simulate other people's mental experiences.

Constitutionally, VR must always present the rudiments of a coherent psycho-sensorial synthesis, by which I mean the combination of sensory basis and mental skills typical of one culture or one generation.

3.0 Shared Vision - Cyberstar '98

International Competition for Interactive Media Environments

In 1998, the WDR Cologne and the GMD - Forschungszentrum Informationstechnik GmbH, Sankt Augustin, present the Cyberstar for the second time. The Cyberstar is a competition on innovative concepts for audiovisual interactive media, organized by GMD and WDR and with the help of eRENA partners and the Stadt Köln. It was first held in 1995.

Cyberstar represents a contribution to media culture in view of progressing technological changes. Whereas the discussion about interactive media techniques mainly focuses on economic aspects, WDR and GMD support cooperation between artists, designers, media specialists and computer experts.

The Competition

Cyberstar aims at creating new interactive ways of communication which reflect and utilize today's state of technology from an artistic and creative point of view.

Concepts for interactive scenarios in the categories

- television
- internet
- stage

have been awarded with prizes of totally DM 35.000. The first prize includes a work term of six months at the GMD where the submitted concept will be developed.

On 16 and 17 April 1998 a preliminary jury met in order to make a first noncommittal comment on the 92 entries. Representatives of WDR, GMD and other institutions discussed the contributions in the categories stage, television and internet.

At the beginning of May the jury decided on the winners, who will be presented on the presentation of prizes on 14 June 1998 in KOMED - Communication and Media Center in the MediaPark Cologne. WDR Fernsehen will report on the event in the night from June 14th, 1998 to June 15th, 1998.

Pre-liminary Jury Meeting

Shared Visions - Cyberstar 98

On 16 and 17 April 1998 a preliminary jury met in order to make a first noncommittal comment on the 92 entries. 21 entries arouse special interest.

The pre-liminary Cyberstar jury meeting has reviewed 92 submissions in 2 days. 22 works were chosen to be presented to the main jury in May. The reviewers came from GMD Birlinghoven, WDR Köln, Stadt Köln, Universität Leipzig, KOMED Köln and from the eRENA partners: ZKM Karlsruhe, KTH-Nada Stockholm, King's College University of London.

The pre-jury session for a preselection of works to be presented to the jury has been undertaken in a 2-day workshop style with brainstorming sessions on possible further developments and implications of the works reviewed.

Jury Meeting

The jury members were:

Karin OHLENSCHLAEGER, journalist and freelance curator, head of Projectos

Culturales, Madrid

Hans-Peter SCHWARZ, head of ZKM, Medienmuseum Karlsruhe

Gerfried STOCKER, general manager of Ars Electronica Center and artistic director of Ars Electronica Festival, Linz

Wolfgang STRAUSS, architect and artist, Bonn/Gargnano in Italy

Georg TROGEMANN, professor for art and media sciences, Kunsthochschule fuer Medien Cologne

Regina WYRWOLL, head of media division, Goethe-Institute headquarters, Munich

Jury Decision

1st Prize

Scholarship for the realisation of the project and DM 20.000

Simon Penny, Traces

TRACES by the Australian media artist Simon Penny is a project networking the GMD-CyberStage with other CAVE systems.

In CyberStage environments, the user finds himself enclosed by stereo projections of the computer generated virtual space. The spatial sound system and vibration mechanisms provide additional mechanisms for rich sensory immersion. The complete perception of the virtual space is unmatched by any other virtual reality system.

Through connecting three of these systems Penny explores the aesthetics of real and tele-presence. The communicating partners are represented through complex algorithmic graphical behaviours: " The user interacts with gossamer spatial traces which have the dynamics and volumes of bodies, but are translucent and ephemeral." (S.P.)

With the winning project of Cyberstar 98, Simon Penny further examines questions which he approached in his earlier installation "Fugitive" (1995-97). The main focus of the artist is to develop "intuitive interfaces", which dismiss use of text or icons, seeking to integrate the whole body in the telecommunication process, instead.

The jury emphasises that Penny does not use the virtual room as a geometric entity but as a networking medium and thus as a communication environment. They are convinced that the development of the Traces project, promotes technical and aesthetic development of advanced telecommunication forms.

2nd Prize

DM 10.000

Atau Tanaka, Kasper Teoplitz, Global String

"Global String" from Atau Tanaka and Kasper Teoblitz connects real and virtual space with the help of music. The installation enables people all around the world to explore, via Internet, the joint creation of musical harmonies.

In their concept the artists propose to send the vibrations of a real string as digital impulses into the internet. In its proposed 15 meters of length the string assumes the form of a sculpture. Simultaneously with the digitalized vibrations a live video image of the player is transmitted. Using such an installation enables geographically distant people around the world to a real-time participation in a shared experience of creating a global melody.

The jury commends the immediate haptic qualities of the interface and the possibilities of the development of a public, world-spanning sculpture. The proposed concept also convinces through its clear and coherent structure, as well as efficient and intelligent use of existing techniques.

3rd Prize

DM 5.000

Kaeko Murata, Café of Elements

Kaeko Murata's concept is the further development of her "Fisherman's Café" project. In this interactive installation the users are sitting at a table in a café. An image recognition system measures the positions of the coffee cups on the table. This steers the creation of computer generated images of waterwaves and fishes that are projected onto the table.

One gets the impression that the waves and swimming fishes are created through the repeated repositioning of the cups on the table. Kaeko Murata proposal for Shared Visions - Cyberstar 98 is the development of a "Café of Elements" where water is accompanied by symbolic representations of the earth (crystals), the air (through wind traces on a sandhill) and the fire (represented through fireworks).

The jury appreciates the poetic character of the installation and its proposed further development and commends the young artist's renunciation of VR stereotypes. Social processes are convincingly intensified through an artistic approach to interactive techniques.

3.1 Summary of the results of the reviewing process

Three categories were available for submitting entries: television, internet and stage, but cross-category references were also possible. The distribution of the entries shows a strong

preference for the stage category with more than a half of the total number referring to it exclusively with the percentage growing to two thirds if cross-category entries are added.

With entries in the categories internet and television, involvement of large audiences is still basically involvement of passive recipients. Partly because of the still existing technical limitations, interactivity is for a happy few and in most cases one still needs the conventional presentator to make it enjoyable for a wide audience.

Most of the concepts proposed were lacking either a genuine notion of interactivity as a sacrifice to TV-style dramaturgy or vice-versa. The impression is that individual artists were either not familiar enough with new interactive media (mostly ones coming with "traditional arts" background), or that they were out of scope in the TV world. It was clear that there is a strong need for more work in multidisciplinary teams combining artists, scientists and professionals if the possibilities are to be explored more fruitfully.

Stage proposals often seem to compensate a limited number of possible active participants through an involvement of the whole body of the participants. They often aim at unsharp interfaces and a number of concepts were designed for CAVE environments.

"Cognitive interfaces" seem not to be as interesting as the modes of communication that are not clearly defined but intuitive and often unexpected. Evolving beings and emergent behaviour are themes which also claimed attention.

Several interesting notions of virtual actors as partners for human performers have been presented, where the actors are trying to respond to performers action in abstract and often vague or ambiguous but esthetically inspiring manner. Interestingly, those were also the ones who addressed the notion of sound-spaces and sound-avatars in most appropriate ways.

A fuller bodily involvement could be noted as a major field of artistic interest. "Dance" is a catchword that kept coming up. The notion of virtual body as extension of the real seems to be gaining more interest than the exclusion approach. An interesting example was an interactive setting using perspective cases of disortion to create physical uncomfort.

Another explored the issues of prosthetics and body transformation experimenting with sophisticated technology in finding ways for the visually impaired to perceive light based performances which acknowledge and build on the impossibility of reconstructing vision.

Surprisingly, very few concepts based on current interactive media dealt with involving more than two participants into play or collaboration. Another common denominator of most of these interactive environements is that they claim a lot of attention on behalf of participants.

Only in Fisherman's Café the interactive setting accompanies everyday life in a way that allows it to fade out of participants conscious awareness, as their communication and interaction continues. Because of the poetics of its esthetics and the subtle exposure of the interaction and communication process in an everyday public setting (cafe) it is an excellent example for further explorations of new notions of public spaces as mixed reality environments.

The production of the Cyberstar competition and awarding ceremony is a main GMD contribution for eRENA. Shared Visions is the topic for the Cyberstar competition '98. The topic was chosen relating to the eRENA context of multi user environments and extended performance. The awarding ceremony will be produced as a shared environment and distributed virtual studio production where the jury members interview the prize winners during broadcasting on WDR - Westdeutscher Rundfunk, Cologne. This production will be based on the artistic concept of Paul Sermon's Telematic Vision.

This production as well as the production of the winner concept will be the main contribution for year 2 and 3.

4.0 Some proposals for possible demonstrators

In this chapter we present examples of concrete artistic concepts as illustrations for possible realizations of specific demonstrators: Paul Sermon's "Telematic Vision" and Simon Penny's "TRACES". Each of these examples illustrates artistic approaches to interactive concepts using different VR media such as CAVE, distributed virtual studio environment etc.

"Telematic Vision" is a distributed and shared mixed reality environment on extended space, a concept of the media artist Paul Sermon. "TRACES" is an extended body performance exploring situated in a CAVE to CAVE setting which is to be developed as part of the concept.

The "Telematic Vision" concept could be produced as a demonstrator and as an integral part for the Cyberstar awarding ceremony. The experience and production of this extended performance could be described (for year two). It is not yet decided what is financially and technically possible to do for the awarding ceremony, so the final form of realization can vary from the proposal as presented in the following section.

4.1. Paul Sermon: "Telematic Vision"

Original proposal by the artist for the Cyberstar awarding ceremony June, 14 in the KOMED house of the Mediapark, Cologne to be produced by WDR and GMD.

4.1.1. Telematic Dreaming - Original statement

In describing my installation I begin with a quote from an Baudrillard essay that presents the starting point for "Telematic Dreaming", through which it interprets itself as a critique of the essay. The celibacy of the machine brings about the celibacy of "Telematic Man".

Exactly as he grants himself the spectacle of his brain and of his intelligence as he sits in front of the computer or word-processor, the "Telematic Man" gives himself the spectacle of his fantasies and of a virtual "jouissance" as he sits in front of his "minitel rose". He exorcises "jouissance" or intelligence in the interface with the machine.

The Other, the sexual or cognitive interlocutor, is never really aimed at - crossing the screen evokes the crossing of the mirror. The screen itself is targeted as the point of interface. The machine (the interactive screen) transforms the process of communication, the relation from one to the other, into a process of commutation, ie. the process of reversibility from the same to the same. The secret of the interface is that the Other is within it virtually the Same otherness being surreptitiously confiscated by the machine."

Telematic Dreaming is an installation that exists within the ISDN digital telephone network. Two separate interfaces are located in separate locations, these interfaces in themselves are

dynamic installations that function as customized video-conferencing systems. A double bed is located within both locations, one in a blacked out space and the other in an illuminated space.

The bed in the light location has a camera situated directly above it, sending a live video image of the bed, and a person ("A") lying on it, to a video projector located above the other bed in the blacked out location. The live video image is projected down on to the bed with another person ("B") on it. A second camera, next to the video projector, sends a live video image of the projection of person "A" with person "B" back to a series of monitors that surround the bed and person "A" in the illuminated location. The telepresent image functions like a mirror that reflects one person within another person's reflection.

"Telematic Dreaming" deliberately plays with the ambiguous connotations of a bed as a telepresent projection surface. The psychological complexity of the object dissolves the geographical distance and technology involved in the complete ISDN installation. The ability to exist outside of the users own space and time is created by an alarmingly real sense of touch that is enhanced by the context of the bed and caused by an acute shift of senses in the telematic space

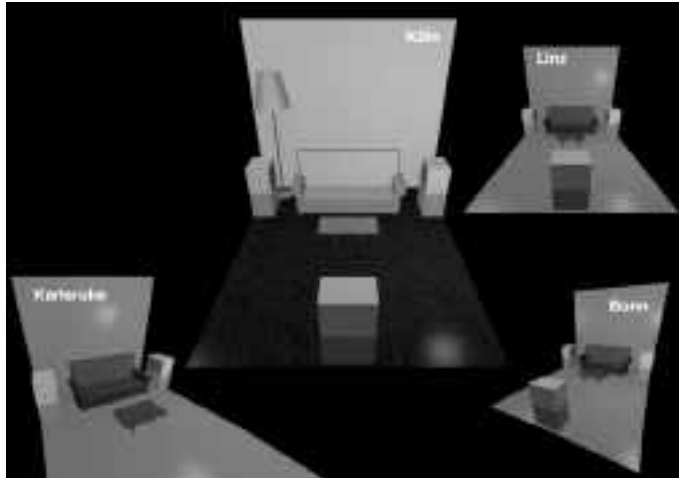
The users' consciousness within the telepresent body is controlled by a voyeurism of its self. The cause and effect interactions of the body determine its own space and time, by extending this through the ISDN network, the body can travel at the speed of light and locate itself wherever it is interacting. In "Telematic Dreaming" the user exchanges their tactile senses and touch by replacing their hands with their eyes.

5.1.2. "Telematic Vision" - Statement

In many ways the sofa and the bed amount to much the same thing, they can also transform themselves into each other, becoming a "sofa/bed". The semiology of the bed, that proved to be so effective in "Telematic Dreaming", is also present within the sofa and is equally as effective in "Telematic Vision". Where "Telematic Vision" and its sofa differ from "Telematic Dreaming" and its bed is in the scenario and theater of its spectacle.

The sofa finds itself between the bed and the television, whilst it retains the semiotic reference to the bed, it also refers directly to television. The television and sofa are caught up in an inseparable scenario. In "Telematic Vision" the sofa is the seat from which the spectacle of television is viewed and the spectacle that is viewed is the audience that sit on the sofa.

Two identical blue sofas are located in dispersed remote locations. In front of each sofa stands a video monitor and camera. The video camera in each location sends a live video image, via ISDN telephone lines, to the other location. The two images are mixed together, via a video effects generator, and displayed on the monitors in front of each sofa in both remote locations simultaneously.



Two more video monitors, displaying the same image, are added to both locations, and stand one meter from the arms on both sides of each sofa. The theater of the spectacle is complete. The viewers in both locations assume the function of the installation and sit down on the sofas to watch television.

At this point they enter the telematic space, watching a live image of themselves sat on a sofa next to another person. They start to explore the space and understand they are now in complete physical control of a telepresent body that can interact with the other person. The more intimate and sophisticated the interaction becomes, the further the users enter into the telematic space.

The division between the remote telepresent body and actual physical body disappears, leaving only one body that exists in and between both locations. Assisted by the object of the sofa and the scenario of the television consciousness is extended and resides solely within the interaction of the user. "Telematic Vision" is a vacant space of potentiality, it is nothing without the presence of a viewer and the interactions of a user who create their own television program by becoming the voyeurs of their own spectacle.

5.1.3. Possible realizations (for Cyberstar)

Four varied concepts for consideration are discussed.

1. Telematic Dreaming - Original Concept

In this original version it is only possible to link two sites together simultaneously. Therefore it would be necessary to rotate the connection between the sites. For example from Köln to ZKM for the first hour, Köln to AEC for the second and to GMD for the last hour.

2. Telematic Dreaming - 3 Way Concept (new version)

In this new version of Telematic Dreaming the installation would function in a way that would allow all three remote users to lie on the same telepresent bed in Köln simultaneously, making interaction possible between all three sites. This version would necessitate a slightly

bigger bed (300cm x 225cm) than the original one. The installation would function as follows: The users at AEC, ZKM and GMD would all be laying on blue beds, each bed would have a camera situated directly above it, sending a live image of a person on the blue bed to Köln.

In Köln all three incoming images are chroma-keyed together - the final chroma-keyed image of the three people in the same bed is video projected onto the bed in Köln. Another video camera, situated next to the video projector, picks up a live image of the three projected users and the actual user laying on the bed in Köln together, and sends it back to monitors that surround the beds in all three illuminated locations simultaneously.

The most significant change in this concept concerns the equipment requirements in Köln. Including 3 chroma-key mixers, 3 ISDN connections and 3 teleconferencing codecs. However it might be possible to use a Teleconferencing Multipoint Bridge and just one codec, which should allow us to answer all three incoming calls simultaneously - this is something

3. Telematic Dreaming & Telematic Vision - Environment

By using two separate installations it will make it possible to construct a kind of stage-set or walk through installation for the audience in Köln, moving from one room to another where the audience would have the possibility of meeting people from either AEC or ZKM. Although the users in AEC and ZKM would not have a visual connection between them in this case, they would be able to communicate with audio.

Basically the complete installation/stage-set in Köln functions in a way that incorporates my two installations that each have a one way connection running simultaneously. Telematic Vision (the sofa) linked to ZKM and Telematic Dreaming linked to AEC.

Telematic Vision functions in a similar conceptual way to the bed, quite simply it chroma-keys an image of a person sitting on a sofa in Karlsruhe on top of an image of a person sitting on a sofa in Köln - the camera angles and distances are identical in both locations, making it appear as if the two remote people are sitting on the same sofa.

4. Telematic Dreaming, Telematic Vision & Tables Turned

Please see concept "Telematic Dreaming & Telematic Vision" for details. This version would incorporate a third one way installation The Tables Turned, that would link the Köln location to GMD via a table scene. The Tables Turned functions in an identical way to Telematic Vision.

4.2. Simon Penny: "TRACES"

Theoretical, Technical and Aesthetic overview.

Introduction

As more of our social and cultural lives occur in wider bandwidth online settings, questions arise about embodiment, virtuality and the possibility to 'be' in two locations at once. "Traces" give users direct experience of having a 'dispersed body' and interacting with traces of other remote bodies. The user interacts with gossamer spatial traces which have the dynamics and volumes of bodies, but are translucent and ephemeral.

Traces is a project for networked CAVEs (immersive VR spaces). The focus is real-time spatial/bodily interaction between distant participants via real-time 3D image (and sound) traces.

The work will function as both a telematic performance environment and a public interactive experience. My previous work "Fugitive" (ZKM 1997) uses infra-red machine vision to extract data about the bodily dynamics of the user (see appended notes and videotape). In 'Traces', each CAVE will use multi-camera stereo machine vision to build real-time body maps of participants.

These bodymaps will then be used to generate abstracted graphical bodily traces in the other CAVEs. If, for instance, three CAVEs are networked, then a participant in CAVE A will interact in real time with image traces of participants in CAVEs B and C. These traces will not necessarily be accurate sculptural representations but may be used to drive complex algorithmic processes which will give rise to changing 3D graphical traces which indicate the presence, gesture and movement of the remote participants.

Hence a person maybe represented as a moving ghostlike transparent and wispy trace or by an avalanche of tumbling rocks. The paths of bodies will persist in the space, each body 'painting' as a three-dimensional brush. Decay time and graphical behavior of these 'traces' will be algorithmically controlled with interactive input.

Not a 'virtual body' in the sense of the 'holodeck', but fleeting, hazy, evanescent, ghostly, chimerical representations like time lapse photographic images and the patterns of oil on water, which make explicit the layers of digital mediation. Interactions will take the form of real-time collaborative sculpting with light, created through dancing with telematic partners.

This form of remote interaction does not map onto conventional categories such as TV or Internet, it expands the concept of 'Stage' into the telematic. The important theoretical foci, along with generating research in real-time wide bandwidth networking, are:

- use of machine vision techniques for rich, but unintrusive, full body tracking and behavior analysis.
- the development of an intuitively meaningful and persuasive
- kinesthetic interface without need of texts, icons or user training.
- to enrich and complexify notions of telepresence and immersion.

3D Graphics and Spatial sound

Traces is concerned with history, in two ways: with cultural history and with embodiment and bodily history. One might say that the twentieth century has been the century of the representation of movement. The research of Muybridge and Marey resulted in new pictorial conventions for the representation of motion (time lapse and multiple exposure photography)

which were quickly exploited by artists, notably Duchamp's "Nude Descending a Staircase" and Giacomo Balla's "Dog on a Leash".

Time and motion were similarly celebrated in the video-feedback works of Nam Jun Paik and others in the early days of video art. Most recently the algorithmic "brush" in computer graphics performs a similar function. In "Traces", the user's body acts as a three dimensional brush. The marks left by the "brush" may be algorithmically manipulated in numerous ways.

These may include:

1. Simulation of monochrome time-lapse photographic effect
2. Simulation of video feedback in 3D
3. Rising smoke effect, where the trace rises up, drifts and disperses, perhaps controlled by the simulation of air currents arising from the history of movement of the users body.
4. Exploding honey, where the traces act like a floating fluid with high surface tension, coalescing into horizontal "drips" then into droplets which finally explode in an effervescent way.
5. Small avalanche, in which the traces become particulate and fall like gravel to the floor under arbitrary gravitational acceleration.
6. Body movements may give rise to complex Artificial life-like entities like three dimensional cellular automata, whose complex behavior may persist over time like an infestation of fireflies in the CAVE.

All these effects will be accompanied by spatialised sound, similarly algorithmically generated, but with naturalistic references. For instance, the entities in 6 may have cicada like buzzing, the explosions in 4 sound like effervescent drinks, and the rocks in 5 like a bump on the head.

Conventionally in a CAVE, there is one privileged maximally stereoscopic position. In Traces, it is desired that the prime stereo location change dynamically with the location of the user.

3D machine vision

The proposed vision system is a smart array of four cameras, one in each corner of the cave, at about 1.5m high. The system will intelligently choose which pair of neighbouring cameras will provide the best full body volume. These 90" stereo images will be used to build a body volume per frame. In the case of ambiguity, images from the remaining cameras will be applied.

Development Plan

Graphics: The basic graphical algorithms will be developed at CMU.

Sensing: The development of the vision system will take advantage of extensive machine vision expertise at the Robotics Institute of Carnegie Mellon University.

System Integration.

Integration of these components into a single CAVE system will occur at the GMD Bonn.

Networking.

To my knowledge, the attempt to network CAVES will be a technical first. Development of networked CAVES will require the cooperation of at least two sites. To my knowledge, CAVES exist at the University of Illinois, at the Forschungszentrum Stuttgart, at the GMD Bonn, The Ars Electronica Center Linz and the ICCTokyo. The AEC has expressed interest in the project.

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1. INTRODUCTION

This is a presentation of the experimental context for the upcoming erena performance seminar and workshop, jointly organised by the ZKM and the International Institute of Puppetry (IIM, Charleville-Mézières, France).

These events are informed by previous performance experience at the ZKM and at the IIM. One such undertaking, the ZKM Virtual Reality opera created in October 1997, is documented in erena work package 2.4.

An earlier motion capture performance workshop at the IIM is described below, prefaced by the reflections on puppetry as interface, and on motion capture as digital shadow theatre, which first prompted this experiment.

An experimental robotics theatre work staged in Imperia, Italy, at the end of September 1997, is also documented. Discussed during and subsequent to our first erena plenary, this experiment touched on many of the issues raised by current erena extended performance research, notably concerning hybrid theatre forms (human, mechanical, electronic, and virtual actors).

2. THEORETICAL BACKGROUND

2.1 Puppetry as Art of Interface

Puppetry is proving to be a rich source of paradigms and gestural techniques for the developers of interfaces, and notably for those seeking to enhance ease of movement and more freely creative involvement within symbolic virtual worlds. An interface is defined in lay terms as a plane or other surface forming a boundary common to two entities (bodies or spaces), whereas computer science defines it as an electronic device enabling communication between two pieces of gear. When one of the pieces of gear happens to be a human being, as in puppetry and motion capture arts, the interface or boundary is not merely objectively instrumental in response to quantifiable ergonomics and efficacy criteria, but is also strongly operative at non-objectifiable levels pertaining to cultural coding and psychology. How the piece of human gear understands and invests himself in interaction, and how in turn this relationship is viewed by the spectator, are impalpable but decisive elements in live animation arts, where the interface is more readily comparable to that separating physicochemical phases, with its characteristic surface tension and interfacial energy.

The use of mixed techniques to animate a puppet, thereby partially programmed and partially manipulable *ad libitum*, extends the registers of life of the factitious creature. This kind of dosage of foreseeable and "spontaneous" reactions, giving rise to disconcertingly human expressiveness, characterises many artificial creatures derived from the latest computer exploits. Like the traditional puppet, an electronic shadow may attain relative autonomy through its programming: it can respect, ignore or defy its "handler", and presents the clear advantage of being evolutive. Tuned into learning algorithms and turned on by performance imperatives, it adapts to its human partner. The process of phagocytosis on which puppetry art depends is thus displaced: rather than sapping its animator's vitality via physical contact, the electronic puppet surreptitiously exploits its human counterpart by sheer calculation. The digital technology vanguard is justifiably proud of the hybridisation it authorises by enabling real body interaction with virtual entities, but it should not be forgotten that hybridisation is

the essence of puppetry, which integrates human and non-human material within a single animate world.

Highly reciprocal puppet/ animator relationships are readily transposable to new animation techniques. For example, thorough exploration of technical quirks such as the movement blunting encountered with certain systems may give rise to unimagined dynamic registers. Creative puppeteers used to building up and tirelessly renewing a veritable dialogue with their materials have much to gain from playing around with capture. In turn, free exploration of capture systems by professional puppeteers allows the manufacturers of these systems to test their limits, obviously, but also to become aware of otherwise ignored expressive potential.

2.2 Motion Capture and Digital Shadows

Motion capture-based animation unfetters human movement and detaches it from our stubbornly Newtonian bodies. Real gesture can be used to drive uncanny forms. Its spatial amplitude and temporal rhythms can be altered to generate movement patterns which, though humanly impossible, contain enough grist to strangely echo recognisable gesture. Insofar as motion capture's very basis is the relationship implemented mathematically between real and virtual bodies, and expressed via their respective dynamics, this technology seems quite naturally to lend itself to the artistry of puppetry.

Injection of puppeteering skills into the realm of motion capture yields particularly disquieting results, human gesture in this instance being twice removed from its source: puppeteers impart movement to inert figures, whose life by proxy is in turn recovered by motion capture devices. Puppeteers are used to working with highly complex interfaces to generate and animate forms which may be very different from their own morphology. Rather than simply espousing physically analogous bodies, they sometimes animate abstract or unfamiliar bodies. Moreover, even humanoid marionettes may call for gesturally distanced manipulators. This is the case when several puppeteers animate a single figure (e.g. the sannintsukai technique employed in ningyô jôruri, more commonly known as bunraku), or when manipulation mechanisms call for codified, non-analogous motion input (e.g. certain string-handling devices). As Kleist states in his famous text, *Über das Marionettentheater* (1810), the puppeteer's fingers enter into a complex relationship with the figures he animates, comparable to the relationship between numbers and their logarithms, or between the asymptote and the hyperbola.

In the context of contemporary motion capture technology, expressive movement reduced to extremely simple, minimalist gesture, like that which so acutely interested Oskar Schlemmer as Bauhaus theatre director in the nineteen-twenties, acquires fascinating new connotations. Schlemmer's *Stick* and *Circle Dances* cunningly test the extent to which invisible human presence manages to pervade abstract ballets of geometric shapes. Motion capture now allows this test to be pushed even further: a figure animated by human gesture is tracked and its digital shadow projected on a screen. In some respects, motion capture can be assimilated with "mechanically reproducible" kinetic art forms such as the cinema. Indeed, once movement has been recorded, the prime mover (the human actor) is redundant: his dynamic model can be reused and modified at will. Where motion capture is integrated into live performance, however, the question of human presence is posed in terms of theatre art, with its specific spatial and temporal immediacy. Hybrid image systems integrating live actors withhold unfathomable spectacular potential, since they implement new types of relationships between human agents and their electronic shadows.

3. RECENT PRACTICAL INVESTIGATIONS

3.1 HANDS-ON ELECTRONIC PUPPETRY WORKSHOP

The workshop held in August 1994 at the International Puppetry Institute in Charleville-Mézières sought to explore and exploit the specific dramatic potential of such hybrid environments. This workshop was designed to allow stage professionals to freely investigate gesture and its captured, digitally translated image in a real-time theatre situation. For three weeks, twenty performing artists (puppeteers, mimes, actors) from eleven countries worked intensively with magnetic and optical motion capture systems. We worked on Silicon Graphics computers (Extreme, Indigo) with the well-known Polhemus Fastrak system, and a non-commercialised six-camera optical system called Primas, developed by Hans Furnee at the Department of Applied Physics, Technical University of Delft. Our software was a new version of Softimage's Creative Environment, which was not yet on the market at the time of the workshop. The equipment was made available by industrial sponsors who recognised that a workshop of this nature provided a unique opportunity for performing some unorthodox "bench tests", and thus obtaining valuable information on products undergoing constant development. They observed much of the workshop activity, particularly preparation of the final "demonstration-performance", and on many occasions actively assisted in solving technical problems. An energetic dialogue emerged between the developers and the artists, with the establishment of several long-term contacts.

Once the workshop members (who were in many cases highly professional puppeteers and mimes, but capture novices) realised that working in virtual space did not mean they could forget about physical parameters - weight, size and shape proved to be just as important as in traditional puppetry - their main concern as artists was not to mechanically execute prescribed trajectories, but to literally get the feel of different types of movement. Technical expertise is of course a criterion in motion capture as in real puppetry, but creative mastery also involves intuition and much trial and error : a puppet is not a track-ball or data-glove, despite the odd confusion these days whereby data glove-wavers sometimes get to be called puppeteers.

Numerous projects elaborated during the workshop evoked Schlemmer's Dessau Bauhaus experiments, in spirit and in form. Four puppeteers wielding Polhemus-tracked geometric primitives conjured up a succession of constantly metamorphosing faces and forms, reminiscent of Schlemmer's *Figurale Kabinett*. Two actor-puppeteers merged to become a human cube for the entire workshop duration: "Elastocube Senior", the initial full-body cube choreography was performed using Primas optical markers, and "Elastocube Junior", a small, manually animated cube was developed for the tighter range of the Polhemus Fastrak device. Another tandem concentrated on animating an elementary line form: the wire-frame image, which tended to be the staple screen version for much of our experimentation, was indeed a fitting electronic counterpart for this piece of semi-rigid foam tubing bearing a set of magnetic sensors. In the live action context, interplay between actor-puppeteers and these simple real-time digital reflections generated sometimes exhilarating spectacle.

3.2 Motion Capture / Emotion Capture Performance

For the final demonstration-performance, we defined a series of short sketches, adopting a cabaret or circus-type format. The technology was not hidden, but rather made obvious for the spectators. For puppeteers, this is a familiar situation corresponding to the practice of the "visible handler", where no attempt is made to occlude the puppet animator – on the contrary,

much of the poignancy of this technique precisely derives from the dramatic tension visibly established between the puppeteer and the figure. The projection screen, which measured about twelve square metres, was set up in the middle of the stage, flanked by the two podiums on which the Fastrak systems were installed, well lit by the projectors. Technical changes were carried out in full view of the public, and during these "carpenter scenes" (the traditional theatre term for interludes performed in front of the curtain during set changes), the artists played out short diversionary sketches.

The performance, which was entitled *Motion Capture, Emotion Capture*, began dramatically, as two ferocious looking men hauled a trembling youth from the first row, and brutally attached the reflective fluorescent balls used for optical capture to his body, before abandoning the shivering, henceforth-tracked body before its computer-generated double on the screen. This gripping beginning, which the actors dubbed the "Crucifixion" scene, served as a brash but theatrically effective metaphorical introduction to an evening of "capture" technology. The Elastocube Junior and Senior numbers were highly successful, as was a number called "Buddhatech", where three puppeteers trained in the triple-handler technique of bunraku, proceeded to levitate a virtual Buddha - a simple 3D sphere, by gradually raising its physical counterpart - a very crude paper mache figure. Direct microphone input to modulate the screened computer graphics was used on several occasions, by singing or via electric instruments interfaced with the graphics system. Much buffoonery ostensibly exploited relations between the real and digital figures, along the lines of music hall artist who, earlier this century, used to juggle and play with screen objects.

This workshop showed how increased accessibility of capture technology can foster new creative approaches to animation, particularly in an extended performance context. Douglas Trumbull's prediction of new theatre forms exploiting the spectacular possibilities of nascent technologies is valid for novel types of hybrid performance, including those, which build upon the millenary traditions of puppetry.

3.3 IMUTE Workshop

A more recent experiment which likewise provides valuable reference material for current arena activity in the field of extended performance took place at the Ecole d'Art d'Aix-en-Provence, then at Teatro Cavour in Imperia, Italy, in the course of 1997. This consisted of a workshop and ensuing theatre performance, jointly designated by the acronym "IMUTE", which stands for "Invention - Modification - Utilisation - de la Technologie - Experimentale". IMUTE was an integral part of the pedagogical programme ensured by LOEIL - Laboratoire Objets Espaces Intelligents Langages, a multidisciplinary permanent studio structure within the art school, dedicated to three dimensional design, sculpture and movement, experimentation in the areas of electronics, mechanics, and robotics being closely coupled with the school's multimedia resources in video, sound, 2D and 3D computer graphics, and Internet projects. The Laboratory was created as a practical antenna of CYPRES, an association of philosophers, scientists, theorists and artists which, since 1991, has organised a series of exemplary multidisciplinary encounters in Aix-en-Provence; despite modest means, these events have provided unique opportunities for generating dialogue between the arts and sciences, the more so in that "pure" conceptual discourse has always been tempered and put to the test by "hands-on" experimentation. The early impetus of Vilem Flusser within the Aix-en-Provence community continues to pervade the intellectual and artistic undertakings of CYPRES and LOEIL, where debate on heady epistemological issues tends to outweigh preoccupations with art institution trends.

Each year, LOEIL organises a thematic workshop, open to art students from other schools, consisting of practical experimentation with parallel lectures and discussions on the given topic. LOEIL offers an unusual experimental arena amongst art education establishments, with a strong interest in artificial life and intelligence, in creation as a heuristic process, and in relocating cultural practice within broader questioning on contemporary technologised society. The 1997 IMUTE workshop, which focussed on building a collective experimental site for creation, drew approximately twenty students from half a dozen French art schools. The permanent pedagogical team at LOEIL was reinforced by outside instructors from the fields of robotics and artificial intelligence, and the performing arts (dance and music). Small groups of students quickly formed, and began to define their projects within the overall experimental arena. Most were initially over-ambitious and technologically unfeasible, but these triggered lively, pedagogically valuable debate to determine the essential features to be developed. Robots which failed to perform as planned ultimately acted as far richer vehicles for discussion and interrogation than devices which functioned successfully. By the end of the course, the students had acquired basic notions concerning simple programmed behaviours, sensor-governed environments, and continuous feedback processing to yield increasingly complex situations (these conceptual acquisitions translated physically as a motley gathering of handicapped robots and relatively uncooperative devices). In addition to systems built within the workshop, we were able to work with several generic industrial robots loaned by structures which closely follow and support CYPRES experimentation; one of these, a pneumatic multitask "arm", proved to be a particularly interesting partner, in that its dimensions (close to two meters in extended position), articulations, and attitudes were conducive to strongly anthropomorphic interpretations.

Apart from specific focus on AI - AL issues, a constant characteristic of LOEIL activity, this workshop was designed as a forum for experimenting and debating new forms of theatricality, and for redefining theatre and performance in the contemporary technologised setting. The initial notion of developing a collective site for creative experimentation was posited as an essentially theatrical starting point, this approach being borne out by the presence of instructor-mentors from the performing arts.

Reflection on various types and qualities of movement and response, be they mechanical, virtual (e.g. conveyed through telecommunications networks), or human, underpinned workshop discussion. The radically different kinds of vision that can be brought to bear on and interpret a given event were evoked, ranging from the automated gaze of an analytical scan, through to the emotionally loaded gaze of a human confronted with an art work. The question of where aesthetic investment and interpretation become operative - and transformative - in the actual viewing situation, arose frequently. There was debate around the notion of "spectacularising" our relationships to machines and our implication within a realm of densely interconnected technical species (mechanised, electromagnetic, computerised, etc.). How to make the actual communications process within this realm visible as theatrical event was a focal issue; this led to investigation to determine how best to frame and stage such an event, so as to imbue it with dramatic meaning. By the end of the workshop, a number of embryonic scenarios had emerged, which were chiefly elaborated around robots endowed with distinct locomotor/ sensor activities, and around human actors encountering machines in unusual situations.

3.4 IMUTE Performance

In the summer of 1997, a team based at the Aix-en-Provence art school, comprised of students, some of the permanent LOEIL staff, and a number of outside participants, prepared

an IMUTE theatre work for a European art school encounter in Imperia, at the end of September 1997. Under the aegis of the European Commission (DG XXII, Community Plan of Action in Artistic Education and Training), three art schools planned a small, three-day festival in this Mediterranean town, each presenting a performance for the space of one evening. Apart from the French art school, these organisations were our host structure, the Instituto Statale d'Arte di Imperia, and the Escuela de Arte "Massana" de Barcelona. Whereas the other schools were intent on creating more traditional theatre works, calling on stage talents amongst their students, the Ecole d'Art d'Aix en Provence, which has no formal theatre-oriented training aspects in its programme, resolved to create a performance installation work in keeping with its pedagogical activity.

The students were led to imagine various finite spaces as theatrical arenas, and to perform - or have machines perform - movements within these spaces, to freely experiment with scale and proxemics from both actor and spectator standpoints. Work with Kitsou Dubois, whose choreographic research deals substantially with body movements in "unnatural" environments (her movement protocols for the French Centre National des Etudes Spatiales are derived from repeated parabolic flight experiments and from intensive underwater training), proved highly productive, particularly experimentation using suspension harnesses of various kinds, which showed how the mere placing of a human or other body in a spatially estranged environment was apt to generate forms of theatricality. The theatrical principles that would govern the September performance were gradually clarified. We decided to build a human-machine world, filled with various kinds of activities electronically mediated in different ways, and to focus, throughout the duration of the theatrical performance, on notions of signal, of signal transfer and transduction, of the communication of information, and of relays.

What we in fact did was technologically primitive but, judging by public response, ultimately quite effective as a performance event. The entire Teatro Cavour auditorium and stage were transformed into a kind of communications space, a closed circuit built of a number of installations generating signals of various kinds which were amenable to further processing and/or re-dispatching by the technical nerve centre or control deck. These included some robotised elements developed in the earlier workshop, and others borrowed from our industrial partners (notably LIRMM, Laboratoire de Robotique & Microelectronique de Montpellier). A large, transparent, inflatable "sound bubble" was mounted, the inner membrane bearing a number of sensors that were activated by two performers clambering on the scaffolding inside the bubble, then processed and relayed via the sound editing deck. Real-time video and sound, along with digital and audio elements elaborated in advance, were permanently mixed and triturated via the editing decks to generate constant, constantly evolving "feedback noise". One of the performers wearing an operational toy camera and powerful flashlight strapped onto a helmet, a crude "head-mounted display" vaguely reminiscent of a miner's helmet, constantly roved around the theatre. Black and white images from the toy camera were relayed via the editing deck to a large projection screen installed on an articulated base, which inscribed sweeping 180° arcs throughout the performance (the screen movement was induced manually by a particularly strong member of the team).

These images, and other visual material gleaned from internet windows, were revamped in real time using the various processing possibilities available (solarisation, wipes, screen partitioning effects, etc.). The performance was accessible via internet, and certain forewarned distant partners provided input from their own sites, including GH.Hovagimyan, a New York based artist who contributed sound material, and Champ Libre, a Montreal structure which was running an International Video and Electronic Art Festival during our Imperia event. Moreover, one of LOEIL's long-term partners, the Distance Learning Laboratory at the

Russian Academy of Sciences, in Pereslavl-Zalessky, sent data via an Ethernet connection which controlled a robot used in the performance. The internet windows onto the world outside the Teatro Cavour uncannily tweaked the geometry of the performance space, since they were tightly integrated into the spectacle yet at the same time patently appeared as autonomous realms. This disrupted the notion of a closed circuit of finite, readily definable geometry, and introduced new notions of inclusion to a performance which remained focussed on signal flow, exchange, and relay phenomena. From the outset, we sought to optimise and dramatise feedback and interlacing between the various installations, in situ and beyond, whose connections synergistically formed the IMUTE performance system, a kind of man-machine or “machinic” organism.

A – perhaps THE - major problem raised by this type of extended performance situation is how to spatially and temporally structure a work with strong installation components, but also heavily involving human action and gesture, for the duration of a theatre work. Standard seating for the public was condemned by the cumbersome installations, and routes through the machine environment had to be carefully decided in advance for security reasons. Consequently, we planned the event as a trajectory or path through the various installations, lasting approximately 45 minutes. Within a work conceived to spectacularise notions of signal and feedback, this flow of spectators – in turn caught up in the mass of visual and audio information being relayed by the IMUTE machine – provided a vital, integral element. Ultimately, in keeping with our goal, IMUTE proved to be a singular theatrical situation, conducive to exploration of the fringe zones where physiological and informational flows come together, where corporeal and electromechanical movements merge.

4. FORTHCOMING EXTENDED PERFORMANCE ACTIVITIES

4.1 June 98 eRENA Performance Seminar

A seminar is being organised on June 6th and 7th at the International Institute of Puppetry, to prepare for the August 98 erena workshop and, in particular, to discuss issues of bodily identification and expressive gesture in the context of real, physical manipulation, and in the context of handling virtual, computer-generated objects. Speakers at this two-day seminar include researchers from erena partner structures (GMD and the University of Nottingham), as well as a computer scientist from Manchester, working with ZKM on the i3 escape project. Indeed, this seminar and the subsequent workshop focus on a number of preoccupations common to both projects, notably questions of gestural dexterity in the development of original interfaces.

In addition to theoretical contributions and discussions, the seminar will feature puppet handling demonstrations by students at the National School of Puppetry at Charleville-Mézières. These demonstrations will provide a practical starting point for discussion on gestural interface characteristics, and on the variety and complexity of coupling modes between the human body and the puppet “interface”. At the same time, potential workshop participants among the students will be given a foretaste of the research, and will participate in building the geometric figures which be our starting point in August. A programmatic description of the seminar follows:

OWN BODIES, OTHER BODIES, VIRTUAL BODIES

6th – 7th June 1998, International Institute of Puppetry

Research on computer-generated objects and beings ascribes growing importance to their proxemics, their behavioural quirks, the legibility of their trajectories and gestures. There are attempts to determine thresholds of recognition to be built into digital realms, allowing us to invest these vital spaces more intuitively. The art of puppetry, built on body-object relations and instrumental gesture, offers such research a particularly rich experimental arena. Puppets engender live, symbolic spaces for action and interaction : although they are handled in keeping with quantifiable mechanical laws, they are first and foremost poetic interfaces, bearers of immeasurable energies. Participants from the arts, philosophy, theatre history and computer science will discuss the gestural poetics latent in digital spaces.

Speakers :

- Louis Bec, zoosystematist, Sorgues
- Barbara Becker, philosopher, GMD, Bonn
- Steve Benford, computer scientist, University of Nottingham
- Sally Jane Norman, performing arts historian, ZKM/IIM
- Steve Pettifer, computer scientist, University of Manchester

4.3 August 98 eRENA Performance Workshop

In August 1998, a two-week "extended performance" workshop is being held in the context of erena research, jointly hosted by the International Institute of Puppetry in Charleville-Mézières, France, and the Zentrum für Kunst und Medientechnologie in Karlsruhe. The aim of this workshop is to implicate corporeal and gestural skills in the animation of real-time digital image configurations, designed for live performance situations. A programmatic description, issued for potential workshop participants, follows :

REAL GESTURES / VIRTUAL ENVIRONMENTS

4th to 16th August 1998, International Institute of Puppetry / ZKM

Computer-generated image and sound environments offer live performance a realm where human action and interaction may engender new poetic meanings. The intelligence of puppeteers, mimes, jugglers, dancers and acrobats is needed to investigate this realm, and flesh it out with the wilful ambiguity of their ancient arts.

The workshop will take place in two successive phases and in two sites; the strolling players' journey will be part of the programme.

At the International Institute of Puppetry (IIM), Charleville-Mézières, a first experimental "bare-boards" phase:

- construction of a working grammar of body-object relations
- elaboration of a repertory of movement and gesture scenarios
- lecture-discussions on this physical grammar, and on the means of transposing it to "virtual" performance spaces.

At the Zentrum für Kunst und Medientechnologie (ZKM), Karlsruhe:

- staging the scenarios across a range of technical infrastructures (blue box with motion control rig, various motion capture and tracker systems)
- a final "performance-demonstration" in the ZKM Medientheater.

Participants : ten puppeteers, mimes, acrobats, dancers, jugglers

Participants are being recruited via the wide international network of performance artists which has been steadily built up by the International Institute of Puppetry as organiser of events and workshops over the past ten years. The course has also been announced within the arena consortium, and within the ZKM networks.

During the first week, the workshop participants will experiment with a number of minimalist geometric objects made out of an array of materials which manifest clearly different physical characteristics and behaviours (e.g. wood, metal, cloth, paper). The objects will be used as puppets in the execution of a number of initial simple action sequences, the same sequence being systematically repeated with each object. This will allow their handlers to grasp the specific dynamic implications of the various figures and materials, and to "interpret" these qualities to dramatic, theatrical effect. The International Puppetry Institute's technical facilities (workshops for building with wood, metal, cloth, and various other materials) will be used to modify or create new objects as required.

During the second week, working at the ZKM with a repertory of computer-generated "doubles" of the geometric figures, the workshop participants will reiterate and further elaborate the scenarios they have already begun to develop with the latter physical objects, testing them in a range of technically distinct configurations. The physical objects will be brought to the ZKM and handled with various kinds of trackers, to enable comparison of the performative qualities of the digitised real figures with those of their purely computer-derived counterparts. A number of different computer-generated settings will be used for the experimentation (static and dynamic, abstract or integrating figurative elements), evoking a range of physical situations, and the effects of these environmental changes on the scenarios will likewise be analysed and exploited for their dramatic implications.

The overall experimentation will kept as simple as possible, limiting the number of figures – real and "virtual" – along with the number of scenarios. This approach will afford sounder comparison and more in-depth investigation of the various technical configurations. It draws on experience acquired during the previous motion capture workshop organised at the International Institute of Puppetry in 1994 (cf. supra), where initially restricted experimental terrain fostered extremely varied performance material, while there were still very useful grounds for comparison, by virtue of the common starting point. As with all IIM workshops, the 1998 event will terminate with a demonstration-performance before a public, in the ZKM Medientheater on the final evening. A "debriefing" will be held the next day to discuss the event and define future developments. The workshop will be comprehensively documented,

and should provide valuable groundwork for the „Event Design and Management“ aspect of our extended performance research (erena work package 4.3).

5. FURTHER INFORMATION AND REFERENCES

For information on the International Institute of Puppetry, see <http://www.ardennes.com/asso/iim>

For a full description of the IMUTE workshop and performance, see <http://siac.it/cypres/imute/>

Additional ZKM/IIM information is posted at the Dance&Technology Zone, <http://www.art.net/~dtz>

Recent online texts by the author on extended performance issues include :

„Theaters of Cyber (Re-)Creation“,

http://www.forum.nokia.com/nf/magazine/mediorama/mor_3_97/light4.html

„Dramatis Personae : Casting Cyberselves“, <http://www.telefonica.es/fat/enorman.html>