The House of Illusion : Extending the Boundaries of Space

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The article presents projects on spatial research and Interface Design. The interdisciplinary work was done at ART+COM and the German National Research Center for Information Technology GMD. The work focuses on new notions of space as they emerge from the use of information and communication technologies. As new forms of perception and experience of time and space emerge, new fields of architecture appear. By using the computer as a media our architects office has changed into a Media Space Lab.

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The digital crash or what happens if....
... the musicians change their instruments?

Working with digital media challenges our preconceptions of things. We stand to lose nothing less than our identity in doing so. In the digital design process, in a stream of calculations, miscalculations occur. Imagine a cube with eight corner points and six sides. Most of us can picture this in our mind's eye. But computers cannot. They do not have the same cultural conditioning as we do. If we enter cubes, cubes and even more cubes into the computer it will eventually respond with a digital crash. Technology only becomes reality through the drama of the crash. Only then does the actual involvement with the machine really begin. The crash calculates cubes in innumerable manifestations as constellations of 8 points and 6 sides in space. This gives rise to a whole series of possibilities, possible manifestations and virtual realities. As in the domain of living things, a form only becomes reality because it undergoes constant change.

"Between 0 + 1" is the name we give to the artistic method we discover following our first crash - the method of decoding and recoding image space. "Between 0 + 1" describes the virtual space that is generated by computing and recomputing. It symbolises a flexible intermediate value, an intermediate space that represents the unknown and the unfocussed between the two fixed values 0 + 1. "Between 0 + 1" plays with the displacement, distortion, stretching and folding of geometry, topology and perspective. Just as if virtual space were fitted with controls and knobs that could be used for the infinitely variable generation of any form that triggers a continuous space metamorphosis. The transformation of the data record transforms virtual cities into planets, gardens or other organisms. Mental images are created in the computer! Images that we turn on their heads and re-interpret from different angles. We find clues to decode the light and sound spaces created using digital-genetic processes. We find them in the distorted images of the anamorphosis and the collage, in high-speed futurism, fragmented cubism and the

crystalline light architecture of Bruno Taut, but also in the analysis of sight.

The speed at which information is conveyed and the quantities involved can be overwhelming for the individual. Can the arts work with science and technology to counteract this feeling of disorientation? To combat disorientation and the omnipresence of technological power we resolve to design "artificial worlds (...) in which we can 'navigate' as if in a game. New metaphors for action time and action space for net travellers" must be devised. Stories should be told that do not pursue narrow narrative forms, but rather incorporate hypermedia, virtual reality and spatial environments.

"Cyber City" - a place of communication

"Berlin - Cyber City" or How do I step into the virtual city? This study is the first of its kind to examine audience anticipation and the use of interactive systems in public spaces. The fall of the Berlin Wall provided the impetus in 1989 for us to take a closer look at our city. The reconstruction of the former capital now reinstated presents a major challenge in urban planning and one for which no-one is prepared. We are interested in making the various plans accessible to the public as a virtual reality game. But how can we convey the complexity of urban planning to a large audience?

The entrance to the "Cyber City" is an aerial shot of Berlin which is secured to a table and forms the reference level of the real city. We play the "let you finger do the walking" game and use an electronic thimble (Polhemus) to move around, show and visualise. The thimble is a sensory mechanism that conveys its positional data on an ongoing basis to the position detector secured underneath the table. The real location on the aerial photograph can thus be coordinated precisely in the computer with the 3-D simulation of the city architecture. The visitor gains both an overview and an insight into the situation. The wall-high projection screen behind the table allows the visitors to follow their virtual trip through the "Tiergarten", past the Congress Hall (now the House of Culture) and the Reichstag. "And this is where we ought to be able to take a stroll through the Brandenburg Gate," calls out an enthusiastic East Berliner and is amazed when he finds he really can "drive through it, turn around and can then even fly back over it".

The table is a metaphor for language and encounter which actually functions. At the international radio and television exhibition in Berlin in 1991 visitors are not discussing the new VR technology but rather what had happened in 1989 when the Wall fell. The virtual table turns urban planning into a discussion of the city that incorporates both past and future. The "Cyber City" can be compared in form with a video sculpture. Set up in a public space it consists of the two elements - a table and a video wall. There are only two main perceptual surfaces: the horizontal (the table with the overview plan that corresponds to the lie of the city) and the vertical (the large video wall which embodies the city facade). The observer becomes a stroller through a virtual film set.

"Home of the Brain" - the computer's memory

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 game and can intervene in it. In 1990 we endeavour to construct Alice's Wonderland. 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. "Home of the Brain" - depicted as a metaphor for the computer's memory - is awarded the Golden Nica of Ars Electronica in 1992. The work is a vision of the future of telecommunications. Four year later it will be possible to work with a similar version on the Internet. The Internet is already being used as a public forum, as a venue for the virtual representation of masks, avatares and agents (intelligent advisers). This vision was still Utopia back in 1992.

"Home of the Brain" is a three-dimensional mandala. Every visitor can move around in this virtual environment using the virtual reality glove and finger gestures. He can fly backwards and forwards. He can penetrate into the depths and move through walls. He can make himself extremely large or extremely small by changing the scale of his environment. He can fly through tunnels and even come face to face with himself. He can view things from the perspective of an ant, a mouse or a bird. He will be constantly surprised by what his new body can now do. The performer's gestures will become immediately visible to himself and his audience through the representation of his hand. The entire production can be observed on monitors or a large video screen. The performer functions like a kind of shadow artist in the virtual space behind the screen. "The virtual hand discloses its true soul to us," explains neurologist Hinderk Emrich commenting on the virtual flight and lively movements of a physically handicapped participant in Geneva whom we are watching via ISDN lines from Berlin. Below the head mounted display he cannot see anything of the outside world and instead sees himself as an integral part of the new virtual world which surrounds him. For a short time he feels himself free of his real body. During the virtual flight he sets his own agenda and develops his own personal perspective of sound, since the objects are interactively associated with sounds, noises and fragments of text.

The "Home of the Brain" is inhabited in virtual terms by pioneers in media development. The thoughts of Vilèm Flusser, Paul Virilio, Joseph Weizenbaum and Marvin Minsky are implemented in the computer's memory. "Do we need that? Why do we need it?". Weizenbaum's warnings against the power of the computer and the impotence of reason wrap themselves around his "House of Hope" on Moebius-like chains of

thought. In Virilio's "House of Disaster", the "racing standstill" is tested under trees falling as if in slow motion. Flusser's "House of Adventure" shows his vision of flowing space: "I dream of a house with walls that can be changed at any time, of a world whose structure is no more than an expression of my ideas". In Minsky's "House of Utopia", a crystalline transformation object, future computer generations are discussed "which are so intelligent that we can be pleased if they keep us as pets". The "Home of the Brain" has anticipated paradigms that today are at the very heart of discussions relating to media communication. They include the organisation if information in virtual space, telepresence, information linking and interaction with objects in virtual space.

"The Responsive Workbench" - thinking with the hand

Man is a mover. If man does not move, he is dead. We have learnt to move our "head" alone. The rest has to remain still. Our society has long since run up against a brick wall, since everything in our head is also turning. Be that as it may, we do not want to remain stuck in old systems. Do we really have to sit still at our work? We want to use our hands. We want to draw, build models and not just be keyboard operators. We want to see these models through the virtual camera. We want to let our eye take flight and spring across the wall of reality. Instead of drafting plans we want to produce 25 frames per second. Film language is exerting an influence on architecture. We are developing a photographic pattern of thinking.

In 1994 we design the "Responsive Workbench" as a virtual work desk. The rigid arrangement of computer monitor and keyboard is to be replaced by a real training situation in which architects, engineers, medical staff and scientists can check and change their work in a simulated environment. The "Responsive Workbench" is a further development of the "table" metaphor used in the "Cyber City" project. Real-life situations and activities have been examined as to whether they can be transferred to virtual reality. The haptic checks with activities such as sketching, drawing, writing and painting are performed intuitively when we work with our hands. Kant calls the hand "man's external brain". The gestures of the hands and the gestures of speech control events on this reactive workbench. The person's own sight and body movements are connected to sensors that open up a dynamic perspective. The machine understands and reads our wishes for every possible observer standpoint and does so immediately from the eyes.

Sensor-controlled stereo goggles makes the objects under the interactive glass projection table appear as transparent holographs. Visual houses can be designed and changed with a virtual reality glove. Every angle of vision, each one of my body movements is recalculated in real time as a function of the virtual object. In medical simulations, the beating heart of a virtual patient can be lifted out, removed and examined from every angle. A self-learning voice recognition system reacts to specific commands in order to keep the hands free for other operations. The user interacts with the virtual scenario, displacing, changing and manipulating

it in order to test it for realism. He can also retrieve information from the computer which works invisibly in the background. The objects and activities themselves become the inputs and outputs for this environment. These is no longer a clearly perceivable interface between the user and the system.

"The Virtual Balance" - looking with the feet

We want to be able to move freely in space while we are thinking. We want to be able to think aloud and want to be able to describe the space we are designing. These descriptions give rise to new moving images in our heads. We generate and develop an idea in discussions with others using our bodies.

Like Hermes the celestial messenger, the observer navigates as a "Skywriter" using "virtual balance" and the metamorphosis of digital landscapes. To do this, he uses neither mouse, joystick or virtual reality glove. He simply has to move his body's centre of gravity accordingly to allow him to fly upwards or downwards, to the right or to the left. Unlike a joystick or mouse which reduces man to minimal reflex actions, "Virtual Balance" requires the coordinated use of the entire body and its perception. Neither time optimisation nor disjointed gestures are required, but rather an interplay of the senses. Apparently without effort, the "Skywriter" is able to fly through virtual landscapes. Linear storytelling is translated into interactive action and transformed into virtual space-time. The dramatic effect of the action is governed by the person's relationship to his own body. Here, too, we observe physically handicapped persons who are motivated in their movements. The ground below their feet becomes an interactive surface and the body's perceptual sensitivity coupled with body balance become a control instrument.

"Virtual Balance" is a navigational system for controlling images through the use of the body. It is also a platform for observing the effect of images on the body. In the "Telepolis" 1995 exhibition in Luxembourg , Luxembourg's Grand Duchess accompanies her tour through the virtual city of Xanten with real-life jumps and reinforced body movements. During the presentation at CeBit '96 in Hanover, neurologist Hinderk Emrich finds himself repeatedly in dance situations and discovers there an "enthralling" perspective of the virtual world.

"Virtual Balance" was developed in 1995. It consists of a platform with 3 weight sensors and is controlled solely by the changes in the position of the human body's centre of gravity. Movements and gestures, the body and the entire perceptual apparatus become the interface. The observer's positional information is passed to the graphical system for the purpose of calculating the current image and the required information. Depending on the level of detail of the virtual model, which is calculated from the distance to the virtual objects, different information content is made available to the observer. For example, the visitor can take a virtual trip into the Xanten of the past. The "Skywriter" recognises a certain amount of detail as he approaches specific houses or temples. With the freely designed elements, the objective when working with the simulation is to

convey a feeling of poetry and to motivate the observer in the learning process and, in doing so, to make him curious about reality. Colonia Ulpia Traiana was a Roman settlement that existed around 100 A.D. and which has been partially reconstructed in the archaeological park in Xanten and is still being excavated. In cooperation with architects, construction engineers, archaeologists and computer scientists a spatial computer model is being constructed on the basis of the archaeologists' current understanding of the structure of this ancient settlement.

This first application in part of a global navigational concept that can be accessed via the Internet or as a permanent installation on site. The "Skywriter" will then fly through virtual continents, eavesdrop on the sounds of the various cultures, or discover the symbol sets of the different peoples. The "Global Passage" around the virtual world is intended to visualise cultural identity and convey this between different cultures. In the longer term, it will be possible to control this virtual world tour using two synchronous interfaces. The navigator will then be accompanied by a second "Skywriter". The coordinated movement of the two navigators is then used to control a shared virtual trip. The multimedia navigational environment is ideally suited for public spaces, banks, department stores and museums in order to be able to make contact with other cultures when travelling to another world or a different location. "Virtual Balance" is envisaged as an interface for navigating in the three dimensional net space, for surfing the Internet, for children, players and performers.

Virtual reality and interactivity as medium - the dissolution of space

Painting, photography and television traditionally assume a static observer who, since the development of the frontal perspective in the Renaissance, has symbolised a distanced, quasi-objective approach. The technologies of virtual reality, on the other hand, anticipates a moving observer who himself is IN the image. Dynamism and constant change are the key features of interactive media, the illusion also encompassing the observer. His movement and location in space determine perspectives and the way of seeing things. He is IN the illusion. Linear spaces with static perspectives and fixed observer standpoints are thus history. Images are becoming virtual spaces unhindered by boundaries. The space is no longer a place, but rather a means.

In physical terms, the observer was always an outsider in the fictive worlds of cinema and television. His involvement in the course of events, in the fiction, called for emotional intelligence, identification and catharsis on the part of the fixed observer who was firmly planted in his seat. With interactive simulation techniques, on the other hand, it is not the mobility of the eye alone that is demanded but of the whole body. From these aspects, the technologies of virtual reality can be linked with other illusion technologies such as panoramas, relief cinema and stereoscopic photography which also enable the eye to move around at will. As with panoramas from the 19th century , interactive media allow

us to develop new dramatic forms of storytelling. The dynamic approach of VR systems is replacing the static perspective of the Renaissance.

In the interactive VR environment, the image space is losing its fixed boundaries. At the same time, while the body's sensation is reinforced, a new feeling for spatial orientation needs to be developed. Identifying the position of the eyes, head and body - like the identification of gestures and speech - has the purpose of harnessing the human senses for directly controlling communication. Man must not be asked to change his body and senses to match the machine. Instead, the machine must to tuned to man's needs. To a far greater extent than with traditional media, the VR media interface serves as a key to the media work and thus determines both the dimension of interaction and the dimension of perception.

We have to bridge the computer with our life experience. The connections between the viewer and the work presented in public is part of the experience we need to develop new man-machine interfaces. Exploring the difference between real space and virtual space, the difference between real time and virtual time, leads us from architecture to cybertecture. Like Jean Cocteau's 'Orphee', we step into the other side of the mirror into a world of images and experience the phenomenon of timeless space.

Short-Bio

Wolfgang Strauss (1951) is architect and visiting professor in interactive media studies at the School of Fine Arts Saarbrücken, Germany. Strauss studied Architecture at the Academie of Fine Arts Berlin and has held teaching positions in Visual Comunication at the HDK Berlin and at the KHM Media Art School Cologne. He was co-founder of ART+COM, Berlin in 1988. Strauss and his partners' - Media Artist Monika Fleischmann and Computer-Scientist Christian A. Bohn - work has been included in exhibitions and festivals of new media art worldwide, awarded in 1992 at Ars Electronica with the Golden Nica. Developing design methods for space-related installations and intermedia forms of representation, his recent work as a guest researcher at the GMD Institute for Media Communication in Sankt Augustin deals with the relationship between the human body and the digital image space.

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