aurispace

n.lavertue, final project thesis

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The text acts as the directional and informative substance for the cd.rom. The issues and projects contained on the cd.rom are explained further in the aurispace text.

project completed December, 1998.

Introduction

Throughout my architectural education I have questioned contemporary standards of architecture while trying to create unique and thoughtful responses, composing hybrid situations, and evaluating the intent of present day products; I have approached my final project no differently. Not knowing what the end design or question would be, I still knew that I would review the present state of architecture and respond to it, more specifically, the paradigm of physicality of architecture.

Original Proposal

"The brain is complex and complicated, enormously so. At times its interconnections seem hopelessly entangled, its operations unfathomable, even mysterious. Still, the brain is a physical device, an organ whose parts extend in space, whose actions extend through time."
Lawrence E. Mark
The Unity of the Senses

In our modern societies, we have numerous spatial environments which currently sustain particular human habitation. This habitation is not of the physical nature, but rather the nonphysical habitation (and acceptance) in varied forms (artificial reality, cyberspace, the space of television, etc.). (These 'nonphysical' environments are those in which we find ourselves everyday, i.e. the database of our bank statements, the cyber chat room, the phone line across continents and numerous others.) The application and use of such environments has grown to an almost ritualistic scale. And, consequently, our bodies seem to be engaging with such environments almost continually. The existence of these environments has become commonplace; we have adopted them into our society. And they have become both appendages to our physical body and to our physical world.

Technology as Bodily Extension

Technology has equipped our bodies with various forms of sensory receptors which can be experienced through the body's 'built in' five senses. Technology shifts our metaphysical selves into alternative realities not fully confined to the physical reality. Technology has unlocked many environments for us to explore and investigate. These environments are understood through an interpretative manipulation of an apparatus and its interaction with one of the body's senses. Through the utilization of technology, we have become less confined to our body as a source of understanding and experiencing. These 'technothetics'[1] have extended space conceptually and, as an alternative to our (physical) reality, expanded the notion of architectural space. (A digital watch can be considered a technothetic in the sense that a little electronic piece of equipment can assist us with making a correlation between space and time.)

With the constant initiation of newer technology and permutations of others into the modern *technocultured* world, the successful continuation of electronically mediated spaces is becoming a more apparent; it's not just for the computer geek anymore. In conjunction, it is transforming aspects of commerce, economics, politics, information, and the concept of space.[2]

The notion that technology supplies our bodies with extra sensory technology is not a completely modern idea In the early 1900s (if not earlier), the American public was well aware of the social implications of technology on the way in which individuals experience space. The mass media went so far as to draw up cartoons of how we would experience the world with out ever leaving our rooms. Below is a description of a sketch from a 1911 *LIFE* magazine.

"An elderly man sits in his parlor, surrounded by all kinds of technical gadgets and robot servants. The tense is a kind of future in the present. Compared with many early depictions of the social role of the new domestic technologies, there is an important difference: the family unit (usually shown together looking at stereoscopic photographs, listening to phonograph recordings, and later listening to the radio or watching the television in the cozy atmosphere of the living room) has disappeared. Indeed, other human beings are present only virtually, by means of TV-like device call the "observiscope," a fantasy device and another manifestation of the "telectroscope", a nineteenth century discursive invention. In this dystopian vision, the observiscope is as a personal surveillance device, enabling the central figure to peep at his son Willie courting a girl. The view is from behind their backs, of course, and other options include "The Family", "The Office", "Golf Matches", and "Aeroplane Race." Nearby is an "International Wireless Home News Service," which

[1] 'Technothetics' is a term that I formed for my own explanation purposes. It refers to prosthetic like devices which are electronically operated.

[2] The Euro dollar (the new monetary system for a large portion of Europe) will be issued electronically two (2) years before the public will actually have the physical version in their hands.

transmits "events as they transpire, accurately recorded," again by choice from a menu, foreshadowing the present commercial online services. Additional gadgets emphasize the "mediatization" of domestic life --- contact with the outside world will happen exclusively by means of various communication technologies, leaving humans isolated with their perversions.

In this image, from the beginning of the twentieth century, we are not very far from the pessimistic late twentieth century Baudrillardian vision about the home turned into a "communication satellite." [3]

This early depiction of the man in his technologically mediated domain is not significant only for its futuristic representation of the present, but is also relevant in that it depicts a man experiencing a world that he does not physically experience simultaneously. Through the use of technothetics, he has enabled himself to understand *and* experience a space beyond the physical space he occupies. The man has extended himself of his physical body and has become reliant upon technology as a source of sensorial stimuli.

Portrayals similar to that of the *LIFE* magazine sketch can now be viewed, for some, as normal working and living situations; surveillance cameras, electronic transactions, code access, digital communications, cyber chat rooms, the list goes on. For some, artificial spaces have become as common and ritualistic waking up in the morning. And for a few, such spaces have become their near vital link to a society they can not or do not interact with physically. Such is the case of 'Peter', a student from the University of Massachusetts.

"Peter is a twenty three year old physics graduate student at the University of Massachusetts. His life revolves around his work in the laboratory and his plans for a life in science. He says that his only friend is his roommate, another student whom he describes as being even more reclusive than he. This circumscribed, almost monastic, life does not represent a radical departure for Peter. He has had heart trouble since he was a child; his health is delicate, one small rebellion, a ski trip when he first came to Boston, put him in the hospital for three (3) weeks. His response has been to circumscribe his world. Peter has never traveled. He lives within a small compass. In an interview, Peter immediately made it clear why he plays on MUDs[4]: I do it so I can talk to people.' He is logged on for at least forty (40) hours a week, but it is hard to call what he does playing a game.' He spends his time on MUDs constructing a life that (in only a seeming paradox) is more expansive than his own. He tells me with delight that the MUD he frequents most often is physically located on a computer in Germany. 'And I started talking to them [the inhabitants of the MUD] and they're like, 'This cost so many and so many Deutschmarks.' And I'm like what are Deutschmarks? Where is this place located?' And they say: Don't you know, this is Germany."

It is from MUDs that Peter has learned what he knows about politics, of economics, of the difference between capitalism and welfare state socialism. He revels in the differences between the styles of American and Europeans on the MUDs and in the thrill of speaking to a player in Norway who can see the Northern Lights.

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[3] Erkki Huhtama, *World Series on Technology and Culture.*

[4] Multi User Dungeons. Interactive (live) cyber chat rooms, sometimes constructed with graphics or built around other activities such as role playing games via computer, etc.

On the MUD, Peter shapes a character, Achilles, who is his ideal self. Life in a University of Massachusetts dorm has put him in modest and unaesthetic circumstances. Yet the room he inhabits on the MUD is elegant, romantic, out of a Ralph Lauren advertisement. Peter's story illustrates several aspects of the relationships of [using] MUD and identity. First, the MUD serves as a kind of Rorschach inkblot, a projection of fantasy. Second, unlike a Rorschach, it does not stay on the page. It is part of Peter's everyday life. Peter's experience (where the computer is a mediator to a reality shared with other people) has put computation more directly in the service of the development of a greater capacity for friendship, and the development of confidence for a greater capacity for intimacy." [5]

Peter shifts the expectation that the physical reality is primary reality. He, for particular reasons, has grown away from the physical world and adopted one which is better suited for him. Peter's story shows that the 'artificial realities' are, more or less, real (an 'alternative' rather than an escape). In a more view, Peter's story identifies the intensity of alternative environments and how capably they may extend the physical body.

There are also more applications of these bodily extensions. Still in development (at the time of this writing) is a surgical tool named the Tactile Optical Sensor. It is capable of generating a tactile surface for the surgeon to 'feel' the inside of a patients body without ever penetrating the skin. The surgeon is 'feeling' an electronic representation of what the physical surface is.

"In minimal invasive surgery high sensory palpation of the organs in the interior body is largely lost. It is the propose of this piece to recover tactile sensing for the surgeon. To achieve this goal, a new tactile optical pressure sensor was developed which allows 64 measuring points to be made in $1cm^2$ surface area with a digital resolution of 16 bits. The sensor was conceived for application in laparoscopic grasping forceps and can be integrated in a sensing rod as well, both 15mm in outside diameter. This optical sensor allows to display graphically indurations spread in the tissue. Furthermore, the measures values serve to activate a vibrotactile display unit for tactile feedback of the measured pressures onto the fingertip of the operator. In order to obtain information regarding requirements for an analog pin positioning mechanism for signal display, an actuator array was implemented with 144 pins on a $4cm^2$ surface area. The array allows various test objects to be recognized in a true scale representation by exploratory movements of the fingers." [6]

With the birth of our 'new senses', new environments of habitation were formed. However, 'where' we were and 'what' we experienced were both questions which had been neglected by many. Even now, as we can 'view' the internal human body without penetrating the skin, communicate with people thousands of miles away for long durations, download information, lose ourselves to ambient sounds, yet little research or experimentation had been done about the 'other side'.

After continued use and habitation of such spaces, a select few have begun testing the potential of alternative spaces.

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[5] Sherry Turkle, "Constructions and Reconstructions of the Self in Virtual Reality"

[6] http://hitsun5.fzk.de:8888/hitwww/mitarb/Fischer/tactile/tactile.html

Limited, documented at least, research has been done on artificial reality, such as "Videoplace" by Myron Krueger. Videoplace, an experiment and installation, extended the body, in addition to extended space. Krueger's research combined the spatial and bodily extensions to experience the space of processed video.

"A VIDEOPLACE environment is a 16' x 24' room with one wall used for rear screen projection. A camera near the side of the screen picks up the participant's image. This image is fed to an outline sensor that digitizes the outline of the participant. The image interpreting processors analyze this outline both in absolute terms (e.g., posture, rate of movement) and in terms of the current interaction (for example, is the participant touching a particular object on the screen? Has the image reached the graphic door?). Posture can be inferred from the outline itself and motion can be determined by comparing the current outline to the one before. Outline sensing is facilitated by the fact that the walls are a neutral color making the participant's image easy to find.

When the participant's actions are understood, they are reported to the control processor which decides what the response is to that behavior, it decides whether to move an object, change its color, move the participant's image, make a sound, etc. When the appropriate responses have been determined, the response processors in charge of graphics and sound are directed to generate them. The graphic response can involve the generation and animation of graphic objects and the manipulation of the participant's image by scan modulation techniques. The separate image elements are merged to create a composite image by an image combined which decides which elements are in front and which are occluded by the others. The composite image is then projected before the participant."[7]

Technological growth had led to the advancement of humans by supplying them with more ways to sense. Simultaneously, technology widened the envelope of what we understand as space.

[7] Artificial Reality.

Technology as Spatial Extension

Each technological product creates and mediates our perception and experience of alternative spatial conditions. One's conception of 'space' has become increasingly influenced and defined (and represented) by the technology. Technology opens new spheres of space, previously unimagined and uninhabitable, breaking down normal perceptions and occupations of architectural space.

'Alternative realities' refers to the now obsolete term "artificial realities"[8]. Alternative realities are the spaces we occupy through the mediation of technology, such as when one uses Multi User Dungeons, views a film, or listens to a composed musical piece. Martijn de Waal states "...the feelings, ideas, and experiences that derive from watching a movie are real, but not the world represented in the movie."[9] De Waal assumes that the 'world represented' is fictitious since it does not and can not exist within our physical reality, however, it does exist in the real world of cinema. Cinematographers, directors, producers *et al* are bound to the precepts of movie making. In order to convey ideas, they must use cinematic techniques which often include physical representations (people, products, etc.).

Many of today's alternative realities are virtual representations or copies of the physical reality. Video conferencing, for example, (based on the board room meeting) now extends into the space of electrons, pixels, and light projection. And the seemingly irreplaceable desktop setup of the corporate office can now be found in equal numbers on virtually every desk in a rectangular form (the computer). Through the generic process of copying the physical, we have easily adapted to virtual settings. Although our utilization of these spaces is abundantly clear, we have not sufficiently exercised the possibilities of them. With this constant application of technological media, architects have the opportunity to reconceive, re-represent, re-evaluate, and re-design present spatial conditions by contrasting them to these new spatial conditions and experiences habitable through technothetics. It will lead to broader understanding and developments of architectural space.

Architectural practice is beginning to investigate the potential of these media and hybridization, including going beyond the simple installation of technology into a physical form. And it has skimmed the surface for an evolutionary change of architecture and alternative space.

Project Intentions

[8] Myron Krueger

[9] Electronic Culture : Technology and Visual Representation

The focus of this final project, on a research level, was to investigate the spatial (and physical) shifts in the architectural design of an alternative aural space. Having focused on the body and the theories of the physical and electronic space, I desired to find more about how the physical body actually *did* respond to space. What was it about the senses that allowed us to experience a space? While conducting this research, I began looking at the senses as responsive mediators, and, more specifically, what were the mental and physical affects of having no sensory input? Sensory deprivation[10] (extensively studied by Dr. John C. Lilly) is a term to describe such an affect. This bodily effect mimics, mentally, the physical creation of space. Upon researching Dr. Lilly's documentation of sensory deprivation I became interested in experimenting with different mediums while the body was completely deprived of all sensorial input, except for one. The intent was to introduce a singular sensed stimulus for which the physical and mental components would both concentrate and 'build' off. For example, a sound would trigger visual effects to be formed that were more intense than if you were to listen to the sound in an open room. The proposed experiment entailed introducing stimulus input, between stage three (3) and four (4) which is singular, only one sense can perceive the stimulus. The stimuli would be either aural, visual, textural or other to force all the human body's senses to feed off this one input.

This is a chronological documentation of sensory deprivation from Dr. John C. Lilly from his online site.

1. For about the first three quarters of an hour, the day's residues are predominant. One is aware of the surroundings, recent problems, etc.
2. Gradually, one begins to relax and more or less enjoys the experience.
3. The feeling of being isolated in space and having nothing to do is restful and relaxing at this stage.
4. But slowly, during the next hour, a tension develops which can be called a 'stimulus-action' hunger; hidden methods of self stimulation develop. If inhibition can win out, the tension may ultimately develop to the point of forcing the subject to leave the tank.
5. Meanwhile, the attention is drawn powerfully to any residual stimulus. Such residual stimuli become the whole content of consciousness to an almost unbearable degree.
6. If this stage is passed without leaving the tank, one notices that one's thoughts have shifted from a directed type of thinking about problems to reveries and fantasies of a highly personal and emotionally charged nature.
7. If the tension and the fantasies are withstood, one may experience the furthest stage which has yet to be explored, projection of visual imagery.

(In the fourth phase, Lilly viewed many who would rub their fingers or shake their arms in order for their body's to have some sort of stimuli.)

For this experiment, I began constructing sounds and samples of an abstract nature; sounds that would allow the users mind to 'create' other sensorial stimuli. These audio compositions were each composed from locally recorded sounds, altered in order to achieve two different effects. (Both of these clips were to be used in the sensory deprivation experiment.) The first piece was designed to create, acoustically and electronically, the common public versus private situation. The second piece was designed in an abstract

[10] Sensory Deprivation is when the body's senses are mostly or fully deprived of any stimuli.

manner to allow for an objective perception of space through sound. Although both were insightful into electronic sound and space, the latter piece was much weaker. The first piece provided some light that sound could not only represent, but it could also let people perceive.

Obviously such experiments would need more time and possibly a small team (and money) in order for me to continue the experiment beyond the proposal stage. In order to continue working on project in a productive manner, I established a criteria or agenda of attitudes to work with, while still staying in line with the compiled research.

Through the understanding that electronic space is becoming widely inhabited, its architectural implications are much less understood. Although many are aware of the possibilities and potential to design in electronic spaces, it appears that only a courageous few have taken the 'leap'. And since these electronic spaces represent mediated experiences, the physical body has to modify the way in which it experiences space. Another concern of the project was to analyze and experiment with aural concepts of space and design. The basis for this position was that architecture has strengthened the visual dominance of how people experience space. Plus, this centralization of the visual continues to produce material and physical architecture. While this paradigm grows, there is an increased inhabitation of electronic spaces and mediums (an immaterial, yet physical concept). The project was directed towards shifting the archetype and using electronic space as a design medium and a produced piece, rather than for representational purposes. The project generated in to device experiments and a series of installations designed and constructed from an immaterial environment exploring the possibility of an aural, electronic space, specifically the cyberEAR© experiment, the quadraphonic headset experiment and the aurispace series of installations.

Project Proposals

The cyberEAR© project began when I found out what this technothetic actually did instead of what I thought it would do. The ad for the product said it "enhances the normal hearing from 300% to 400%. Detects rattles, leaking gases, air, and other mechanical abnormalities."[11] In effect this device intended to provide the wearer with an alternative experience of the same space with the aid of some device. The project intention was to investigate the spatial considerations and the user implications of a device which would effect the way in which we experience space. The cyberEAR© actually accomplished this, but not in the manner which I thought it would. After experimenting with the device, I found that it actually amplified *everything*. What I observed through this was that people using the device would jump, scream, or react quickly when normal volume noises would occur. It provided not only the user with a different (if not frightening) experience, but others around them as well, mainly because the user would stir up the place.[12]

The quadraphonic headset project was another device to not only experiment with, but to design and construct as well. The device was worn by one person and they moved through space similarly to that of the cyberEAR©. However, the sonic effects of the headset were quite different. The headset was equipped with four speakers, two in the front and two in the rear. There were also mini amplifiers located on a backpack linked to two microphones on metal rods about 2 1/2 feet (90cm) in length. Each microphone was amplified to two speakers, either in the front or in the back. This produced a 90° rotation of the sound space which the person perceived. Thus, the wearer would experience a different space of sound associated with the actual physical surroundings. (Fortunately, the front speakers aided in deterring the wearer from using their vision since it blocked some of it.)

The final project proposal was a complex combination of the previous two projects.

The purpose of the installation project was to explore the possibilities and potential of an aural space concerning design and architecture, to design and construct space from one which is not the physical one. The project generated into a series of installations designed and constructed from an immaterial environment exploring the possibility of an aural, electronic space as an architectural concept.

The site of the installation was the Architecture Library. The library space provided a low volume and high person usage that the installation was designed around. The installation itself was comprised of pressure and sound sensors triggering audio files to play aloud within the space. Site specific actions or sounds were actuators for the triggers (i.e. removing a book from a shelf or using the photocopier). Different users caused different configurations of sound spaces to be constructed. And since users moved in various manners, the room was in a dynamic flux from one sound space to the other. The main intent was, and still is, for the user(s) to experience a sound space which is being mediated through an electronic medium, also for the aural space to become centralized and for the visual and physical space to be decentralized and defocused. The sounds varied from sounds specific to a library setting, natural sounds, and sounds which possess spatial

[11] *Amazing Electronics* magazine

[12] The video pieces each document the cyberEAR© in use in the same space. On the bottom of each screen a graph fluctuates depending on the what the user is hearing, which is actually recorded onto the video itself.

qualities. There was also a live recording element which would get sampled in various ways (dependent on the version) and would be delayed 20 seconds before being broadcast in the library space.

The spatial version was the initial version of the installation. The sounds within the installation were low-reverberative and ambient sounds. The origin of the sounds were completely dissolved into the editing of the sounds and they became very abstract. After being in the library while those sounds were playing out loud in the space(opposed to listening to them on headphones), I realized they were not producing the aural effect I was hoping for. Although the sounds are intriguing, they remained too abstract and distant from the library or from any sound that would be understandable aurally. They produced a sound space, but none which was related to that of the space in which they were occurring.

The sounds of the library version were more definite. This version was composed of site specific sounds and were capable of expanding the acoustics of the library itself as a sound space. However some of the sounds were unrecognizable and often there was a lost link between the installation and the space because the sounds were too familiar to the location.

The natural version remained split between the two previous versions. It was composed of familiar sounds *unfamiliar* to the site. The outcome was that the library users would experience, sensually, two different aspects of reality, however the two were not meshed in either the physical or the electronic, but rather somewhere in between.

For those who are interested, here is a breakdown of the electronic equipment setup:

Two triggers (made from piezo transducers[13]) were connected to an Alesis® gate/compressor[14] then to a drum module. The remaining eight triggers were connected directly to an Alesis® D4 drum module[15] (MIDI[16]). The MIDI information ran from a single MIDI output to a MIDI interface[17]. The MIDI interface was plugged into a PowerMac® operating the application MAX®/MSP®. This application would read the MIDI note information and play redefined sounds. The audio outputs from the computer were then plugged into a simple stereo amplifier which routed the sound to the speaker.

A condenser microphone[18] was plugged into a Mackie® audio board[19]. The sound output from the audio board was plugged into the microphone input on the computer.

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[13] The electronic contact piece often found in doorbells.

[14] Used for signal amplification.

[15] Drum modules will send a drum sounding MIDI signal when it is triggered. The main component of any electronic drum kit.

[16] Musical Instrument Digital Interface.

[17] Device used to convert MIDI to Macintosh information/signals.

[18] Microphone used to capture a wide range of frequencies.

[19] Used to adjust and balance the frequency ranges.

Resolutions

In terms of trying to seam a closure to the project in a 'finished' piece, I have found myself in a position where I view the project as an individual learning tool and as a proposition or question on the potential of architecture. The project acts as a representation of what sound is capable of achieving in architectural situation. Also, by designing and constructing the project (as opposed to simply proposing it), the project, and I, have gained enormously.

Many assumptions became clear through the actual act of ‘making a space'. The potential of the project has grown beyond the extent of installing audio into the space, or any space, as well. Through the project, I have begun to imagine how the aural aspects can shift over time, increase in volume, expand and compress acoustic room size. And also, other manipulations of the sound space of a functional space to alter the experience of architectural physical space; not just in academic practice, but in ‘real' architectural practice.

How does this relate to architecture?

As I view architecture, it is the design of space for human habitation. Through my research and thesis, I have proposed that human habitation extends beyond the physical world; and *where* it extends is another type of space for which architects can conceive, design, and create. This project is evidence of that potential.

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