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Cybrids:
Integrating Cognitive and Physical Space in Architecture

Spaces and Media

Spatial constructs - cognitive spaces - result from the mind's composing an image of the world. They allow objects to be related to one another, making comparison, relationship and evaluation possible. They also play a primary role in relational and qualitative judgment. Qualitative thought depends on information set in context and allows people to evaluate issues with respect to one another before taking action. It helps us select a brand at the grocery store or size a window in a fa1ade.

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

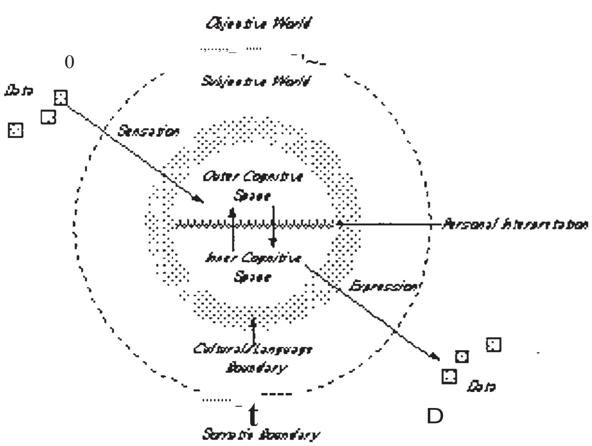


Figure 1

Architecture and Cyberspace

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

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

Four issues relate physical space to cyberspace:

1) Parity between physical and cyberspace via cognitive space;
2) The resultant transformation of physical architecture;
3) The anomalies of translating the spatial metaphor to 30 environments;
4) The possibility of creating hybrid schemes - cybrids - that exist both in physical and cyberspaces.

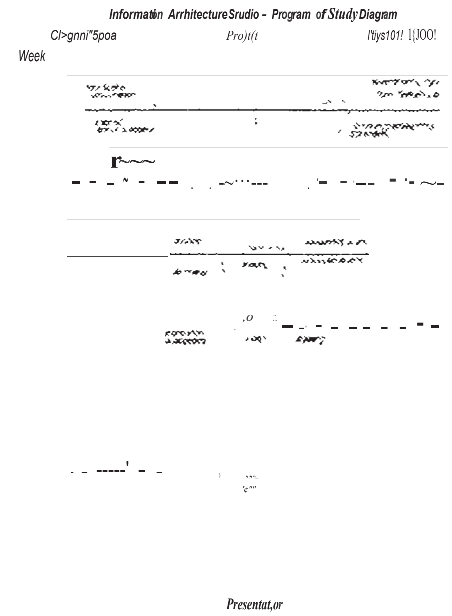


Figure 2: This schedule graphic developed for the Information Architecture Studio shows the concurrent development of physical and cyberspace strategies. The Definition/Analysis portion of the semester dealt with each separately. The Generation/Synthesis portion brought the two strategies together in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

Cyt,er/Real Parity

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

Sublimation and Reification

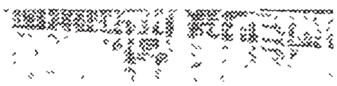
In teams of three, the students documented each building, doing formal, functional and typological analyses of their organization. While this is standard procedure in many architecture schools, here the focus was on information and its influence on architecture. The students were transforming an existing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

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

The students derived the logical structure of the MUDs by navigating them in groups and mapping them according to cardinal directlons.f a room was accessed using arr'n" command, it was mapped as a cube situated north from the previous room. Rooms not accessed this way are mapped as spheres connected arbitrarily to the previous node. The resulting Logical Adjacency Maps, l.AMs, were built as physical models to stress their presence as cognitive objects. Since the physical buildings were also mapped in this way, it was possible to compare the structures of the sublimated architecture with the reified MUD environment [Figs.3, 4].

Cybrids

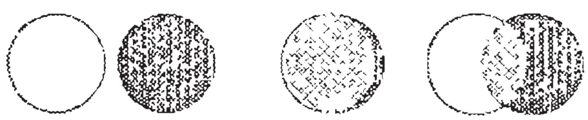
The students then developed programs for their own building design. In the functional analysis of the physical buildings, the students had to derive the subject building's program - working backwards from its plans and sections.They took the existing building program,modifying it in response to their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



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

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

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

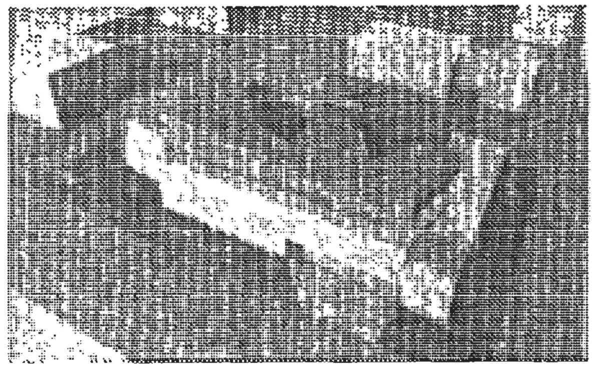


Distinct Physical and Cyberspaces *Cnngruenr Spaces* *Overlapping Spaces*

Figure *S*

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

The *Overlapping* relationship is currently seen in analog and digital fonms. For example,manyteleconferenclng and telepresence systems serve specific spaces in buildings. This is limited due *to* the expense anc relative rarity of the technology.The space is perceived asa camera image and is usually not navigable b\ the viewer unless the camera is operated through remote control



Figures6, 7: Irus art museum by Mark Mrcchell used various v1ew1ng angles on the e,ist,ng ste to detenmine its geometry.Vertical surfaces were created by refracting the reflections from a pool through a hypothetical solid. Ihe cyberspace of the museum, shown on the right, extends the surfaces of the building beyond its periphery. Cybereal additions to physical art displays would be accessible by the building occupants as well as those entering the facility from the Internet.

The cyberspaces designed by the students were typically less static *than* those found in conventiona architecture. The designers wanted to convey the impenmanence and subjectivity of these kinds o space. I encouraged them to examine the principles underlying the physical architecture and lettin; them infonm the cyberspace configuration. There would be a geometric, conceptual link back to th1 physical architecture. But this geometry would only be the organizational skeleton of the building Fixed room configuration would only occur if the cyberspace overlapped the physical. This overlai would happen if occupants of the physical space needed to confer with occupants of the cyberspace o if surveillance of the physical building were an issue.

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

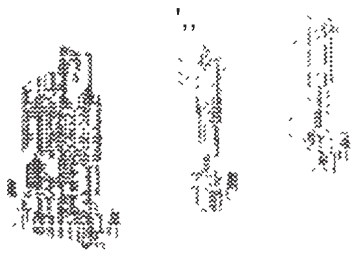
In several cases the students based their cyberspaces on the principle underlying their physical solution Ranah Hammash's solution for a rare books library used the freeform geometry of her physical buildinc to extend and orient the cyberspaces beyond it. Watinee Thantranon's design for a law library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

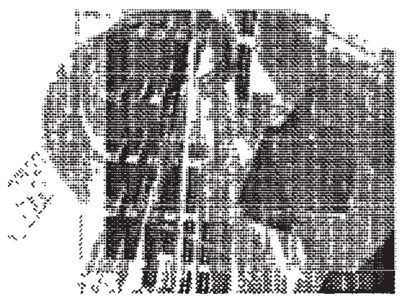
Although the cyberspaces referred to the architecture of the physical buildings, these spaces *ohen* di, not take the shape of conventional rooms. Students took advantage of the disembodied nature of th, space by stressing information display over containment.An example would be rooms which existed a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

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

Self, Sodety, andSpace

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





Figures8, 9: This law library by Watinee Thantranon exists almost entirely in cyberspace. Only the lowest part is an overlay onto an existing Gothic structure which houses a physical reading room. The cyberspace reconfigures itself for each user. Whil the organization of spaces stays the same, only some are apparentto each user, customizing the space for each use.The image on the left shows several configurations of the complex's cyberspace as seen from the Internet On the right is a view from within the cyberspace.

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

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

Conclusion

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

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

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EmergentMind: Art in the Technoetic Dimension

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

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

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

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