The Structures of Memory:
New Modes of Depicting Existing Architecture

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This paper outlines the theoretical premises and the methodology which I used in my research conducted at the University of Minnesota. This research has been aimed at integrating photography and computer graphics. This, so called, photographic mapping was used to represent how a building creates the sequences of interrelated experiences and how it structures our perception of its symbolic reality. This paper will be illustrated by two particular images which will be used as the backdrop for the discussion of their compositions and the ideas embodied in them.

Though I am going to focus here specifically on this part of my research which dealt with the new digital modes of depicting existing architecture, this essay needs to be seen as an integral part of my current project concerning the history and theory of representation in architecture. It is my contention that digital technologies should be explored in the broader context of architectural significatory practices.

Before I develop my argument, I would like first to explain how my work can be seen vis-à-vis other uses of computers in architecture. Let me begin by saying that computers transform the processes of perception and cognition. This transformation organizes what can be recognized as digital data and structures the output, that is how the outcome of digital operations is made perceivable. My work started with the comparative analysis of the distinction between the perception and cognition of a building when it is depicted with the help of software and the perception and cognition of that building and cognition of that building which is not mediated by technology. My study led me to the following conclusions: (1) Software used in architecture was initially developed outside the domain of architecture; (2) High cost of digital technologies leads to its fastest development in two areas of application: an analysis of building's physical performance and promotion of architectural designs; (3) The development of technology in these two areas starts to dominate not only the operations of architectural offices but also the popular perception of what architects do.

Computer Aided Design systems constitute the basis of the analytical approach to architecture. What this system admits as valid information pertains only to attributes of architecture that can be measured and verified as true or false. Following Cartesian duality between matter and thought, only a physical form is recognized to be the object of cognition. Lines on the screen, either in a plan view or in the wireframe model, refer exclusively to the sizes and the positions of the physical elements of architecture. Only this kind of rationally structured map allows one to analyze the quantitative complexity of a building. For example, the performance of structural elements, energy loss and gain, as well as simple information of number and location of multiple elements needed to assemble a building are organized by a system of CAD drawings. What is however excluded in this process is the other side of the Cartesian duality, that is to say, everything that architects design in order to trigger the interaction between architecture and human thought. A building has a symbolic value only when it is perceived as a reality in which physicality of form is only one of many dimensions which human thought is meant to perceive and to reflect upon.

Contemporary software used to promote architecture makes use of the other side of the Cartesian duality — the total control of perception. The most advanced digital technology for simulations of photorealistic views of prospective architecture evolved from the applications designed for entertainment industry. A client's need to see a real-like model is not that different from the appetite for special digital effects that draws crowds of people to movie theaters. Traditionally rendered, photorealistic, still images are much less attractive that the virtual-reality walk through a prospective building. The commercial usefulness of such a visual simulation depends on the assumption that it is possible to digitally control visual sensations. Moreover, visual sensations are equated with visual experiences in architecture. In the future, not only still images, but real time virtual reality will be constructed in such a manner that texture mapping, light rendering, and resolution of pictures will make it difficult to distinguish between simulation and the viewing of a material building. Be as it may, but it needs to be noted that our fascination with how visual sensations are con-

structed draws attention only to the instantaneous perception of what is made available within the field of vision. It is telling that despite the fact that digital technology can construct a multitude of projection systems, it is always perspectival, unioptical, view that is used in simulations. This is the view that equates viewing with visual possession. In this process, architecture is reduced to a flow of images whose function is to dazzle and seduce a potential client.

Despite the undeniable usefulness of these two uses of digital technology in architecture, I would like to draw attention to these attributes of architecture which are often made invisible when architecture is reduced to a quantitative construct or a visual effect. What is often left out is how architecture interacts with human thought. The relationship between architecture and thought is shaped by an architectural form. The way a particular place, with all its characteristics, acquires its possible readings is by establishing an interplay between experiences created by this form and all that a person remembers and values in this specific place and at that specific time. In this interplay, architecture, a physical construct, is placed in a complex network of references.

This way of turning immediacy of perception into symbolic process of representation in architecture is analogous to Jean-Francis Lyotard's *representational consciousness*. Lyotard states that the accumulation of experiences and the delay of the immediacy of reaction to what is being perceived at a particular moment shows

> [...] how perception stops being "pure," i.e. instantaneous, and how representational consciousness can be born of this reflection (in the optical sense), of this "echo," of the influx on the set of other possible—but currently ignored—paths which form memory.[1]

It is this process of structuring of experiences and accumulative stimulation of thought which is essential for the symbolic functioning of architecture. Architecture encourages that any instantaneous visual sensation be placed in the field of memory. Recollections of previous experiences, memory of the material and symbolic contexts in which a place exists, physical and metaphoric distance, create a complex network of references in a mental space where the reading of symbolic meanings is made possible.

In my work, the recognition that thought can be guided and organized by the specificity of architectural form, became a central issue. In architecture, the field of individual or culturally-shared memories is always superimposed on a particular composition of an architectural space. Buildings consist of parts that can be seen one at a time. The way each element can be entered or exited encourages the memories of what has already happened and the anticipation of what may happen. The relationships created by these places may unite various thoughts or they may establish a dialogue between conflicting concepts. These relationships are established because of a particular dimension of material form, distances within a building, or changes in light intensity. To substantiate this point I will present this part of my current

research which attempted to digitally map out how a particular building was designed to heighten these processes of interdependence between thought and architecture.

To test how new technology can be used to map out the symbolic attributes of architecture, I created a specific strategy. Three initial decisions provided a conceptual framework for my work:

1 Instead of prospective, I studied historic and materially existing architecture;
2 Instead of placing emphasis on the newest technical possibilities of digital technology, I studied traditional notion of mapping as production of still pictures;
3 Instead of approaching digital technology as revolutionary medium, I attempted to understand new opportunities that the computer graphics create in the context of history of representational techniques and conventions in architecture.

Consequently, the primary objective of this research was to develop and test what I call a photographic mapping.[2] This mapping was meant to capture these attributes of buildings' composition which structure the processes of perception and cognition of its symbolic reality. The buildings which I studied are located in Greece, Italy, Poland, Romania, Spain, Guatemala, Mexico, and the United States. Practically, such work required visiting a particular building and documenting its perceptual characteristics on site. In each case, I visited a particular building and identified which attributes of its space have the strongest impact on the way this building implies possible modes of experience. For example, the building's ability to direct attention to its particular features, its ability to suggest play of analogies, as well as its ability to organize multiple experiences in one's memory. These characteristics had to be conceptualized as a particular way of viewing which the space privileged. Next, these multiple experiences and the structure of their symbolic interdependencies were transformed into a multiplicity of photographs. The number of pictures which captured that something which seemed essential for structuring of one's perception varied from a few pictures to four thirty-six exposure rolls in one building. In many cases, a particular building implied many structures of experience which were equally significant. A particular set of photographic documentation, however, was to present one set of attributes which established a strong sense of symbolic relationships within and without architecture. The multiple photographs when brought to Minneapolis became a rough representational material for the next phase of my studies. Most of this work was done with the help of a computer. The images were scanned and converted into high resolution graphic files. Additional information concerning building form, such as measured drawings, was studied and prepared for a digital integration. One of the crucial elements of this phase of research was to explore how reality was depicted at the time when the building was constructed. In my approach it was essential to view architectural space as yet another device for representing symbolic reality. In some cases, architectural sketches, and, in some other cases, illustrations
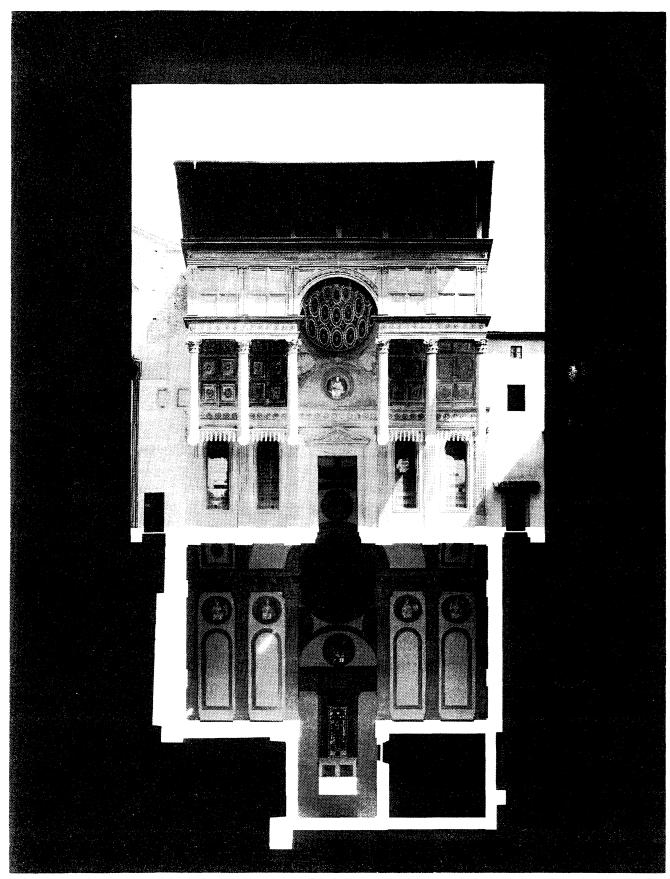
Fig. 1. The Pazzi Chapel in Florence, Italy.

of mythical events provided the most interesting insights into the symbolic structuring of perception and cognition of that time. At the end of this process, multiple photographs taken at the architectural site would be assembled into a composition in order to heighten their ability to represent symbolic characteristics of that architecture.

These pictorial compositions were assembled electronically using Adobe Photoshop software. Most of the images were created as RGB, high resolution files, varying in sizes approximately from thirty to one hundred fifty MB. These files were later professionally recorded on large format photographic films and photographically printed. At this moment, the collection of such images consists of twelve twenty-by-twenty-four-inch Ilfochrome and C prints.[2]

To illustrate how this photographic mapping works as a mode of representation, I would like to discuss here two compositions. As I have already mentioned, each photographic map is conceived in direct response to the idiosyncratic features of a piece of architecture. However, my objective here is to reveal how my strategy makes the representation of these various attributes possible. For this reason, instead of discussing a single picture, I will compare

two different but related samples. The two images that I am going to discuss are: the study of the Pazzi Chapel in Florence, Italy, (Fig. 1); and the study of Kukulcán in Chichén Itzá, Mexico, (Fig. 2). Though different in their cultural setting and time of construction, these two buildings exemplify the temples of their time.

One of the most important questions that photographic mapping enforces is what kind of "mental viewing" a particular building privileges, or what needs to be seen in one's mind when the experience of the whole building is recalled. This question is essential here because buildings are not the assemblages of equally memorable experiences. In architectural space of the Pazzi Chapel and Kukulcán, what is seen at a particular moment exists in a particular relationship to other views possible in the space of these individual buildings and their surrounding.

The Pazzi Chapel consists of three volumes organized along the line of symmetry. Though separate, because located outdoor and indoor and different in size and degree of enclosure, these volumes are highly integrated. It is the use of linear elements, the front colonnade and pilasters, that creates the superstructure which unites all components of
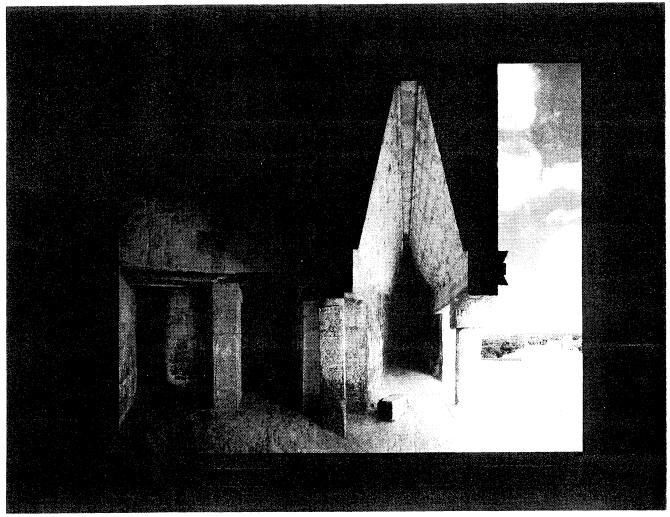

Fig. 2. Kukulcán in Chichén Itzá, Mexico.

this building. The emphasis on the frontality in viewing and the direct movement through space reinforces the omnipresence of the system of regulating lines created by play of shadow and the darkness of pietra serena. The whole form of a building can be seen a system of regulating lines constructed in space and then translated into rooms, walls, doors, and windows. In response to this discovery, my photographic mapping was meant to capture how the consistency of the articulated lines integrates the various layers of this space. The composition of this picture follows what the building suggests. A worm view vertical oblique projection system seems to work in a similar way as the multilayered experience of this building. This projection system emphasizes the lining up and the repetition of orthographic articulation of this architectural form. When moving through the main entry sequence and through the layers of columns and walls, a person would see and remember the repetition of locations and sizes of the articulated elements. Even when facing the furthest wall behind the alter, a person is aware of its position in precisely regulated order of this symbolic reality. What made this building a Renaissance composition was the fact that it gave the priority to the construction of space in the interplay of cognitive processes.[4]

Kukulcán, though it consists of a similar number of spatial elements and is similar in physical size, provides a completely different sequence of symbolic experiences. In Kukulcán, each chamber presents itself as a separate symbolic domain. This sense of separateness of symbolic singularities, which a person experiences, can be seen as analogous to the structure of a mythical Mayan universe. This symbolic reality was interpreted as consisting of multiple layered domains of the sky and the earth. These symbolic worlds were inhabited by the mythical impersonifications of the forces of nature.[5] It is this kind of structuring of human perception and cognition which can be uncovered in the composition of Kukulcán. The two inner chambers of that temple exist in a physical proximity, but their experiential characteristics emphasize their separateness. Each volume draws attention to its verticality which gives these spaces a figural character. The simplicity and symmetry of the shape of each space, symbolically carved out from the solidity of a stone, adds to this reading of form. As the result, the sequence of experience for a person who enters Kukulcán consists of three elemental conditions: of being at the top of the platform and in front of the temple, of being in the transverse, narrow but tall, space of the first chamber, and of being in the most inner second chamber partially-filled with massive structural elements. In response to this reading of how Kukulcán structures the processes of perception and cognition, I decided that a cross-section view may reveal these attributes. My photographic map, not only shows how the articulation of a shape of vertical space creates these singularities of an experience, but it also brings to the fore the sense of entering into the solid interior.

Another quality of architecture that became crucial in photographic mapping of these two buildings was symbolic structuring of daylight. Photography allowed me to capture the complexity of light phenomena with great accuracy. However it is the possibility of using a computer to map out light as an integral part of spatial and experiential relationships which reveals what light contributes to the symbolic functioning of architecture in these two buildings.

In the Pazzi Chapel daylight fills all the spaces. Though a screen of columns admits much more light than big stain-glass windows, the sense of light filtering through the structure permeates the whole space. As my composition shows, light intensity changes though this change is subtle when a person crosses the threshold of the door. The similarity of light distribution on the exterior and interior walls, instead of emphasizing the distinction between the inside and outside, draws attention to the same sense of continuity and integrity which I have already noted. It is the articulation of architectural form that becomes well-visible in this even light.

Daylight in Kukulcán operates in a very different way. As my composition shows, the range of light conditions differs from almost unbearable brightness of Mexican sun outside of the temple to a low-intensity light deep inside which makes visual perception almost impossible. The reason why the vaulted tall ceiling of the second chamber is barely visible on the picture is because very little light reaches that place. Though I might have compensated the exposure and photographed this space with high visibility of details, my intention was to show how the perception of this inner space was made difficult. One's inability to distinguish visually between surfaces and shapes enhanced the tactile and auditory perception. In so doing, it added to a symbolic dimension to how this place resembles a mythical underworld. This stimulation of the interplay of various modes of perception was an integral part of Mayan symbolic practices.

This comparison of the uses of daylight in the constitution of symbolic reality reveals that the manner in which architectural form is usually recorded in the West evolved from the practice which emerged in the Renaissance — from Brunelleschi's construction of perspectival space which was translated into a unequivocal construction of cognitive processes. As the light record in Kukulcán shows, photographic mapping creates a chance of capturing other modes of perception and cognition.

The last issue that was important in the construction of the two images was the symbolic relationship between architecture and its surroundings. The vertical oblique view used for the Pazzi Chapel reveals that this piece of architecture can be thought of as a composition of many parallel elevations. The wall surrounding the courtyard of Santa Croce cloister, where the chapel is located, exists as one of these layers. As the picture shows, the chapel grows out of, or transforms the already exiting wall. The front colonnade creates an illusion that it is the outer surface of that wall which was peeled off, structured by a screen of columns, and slightly shifted in space. The already existing wall itself exists in an almost unaltered form. It flows continuously behind the columns and the architectural articulation of pilasters seems to be

almost accidental. The interior elevation creates a replica of the already existing wall and its new articulation, but the emphasis here is on the dark lines drawn on the surface. The inner elevation reveals clearly how the regulating lines transform all the walls, including the already existing wall outside which is still remembered, into a set of interrelated elevations. The interaction between the three elevations creates a possibility for a symbolic act of transformation of the already existing wall of the courtyard into the place of the chapel.

Kukulcán presents a different symbolic functioning of architecture. The cross-sectional view shows how the positioning of this temple in its surroundings acquires a symbolic meaning. Unlike transformations of the material reality of the Pazzi Chapel, Kukulcán, always positions a person in both a physical and metaphysical place. The temple is located on the top of a pyramid. One needs to climb above the line of trees and to see the horizon before he or she can enter the temple. It is this moment when a person stands on the front platform, as if suspended between "heaven" and "earth," which prepares for and propels the next experience. As my picture attempted to show, the transition in the experiences could not be more intense than the experience of leaving the elevated space flooded with light and entering a small, compressed and dark interior of the Kukulcán temple. It is this movement from one extreme condition to another that gives it metaphoric richness.

In conclusion, there is no doubt that digital technology will have a lasting and positive effect on architectural thought. The digital data management and the new analytical methods in a design process will provide scientific grounds for decision making process in architecture. Buildings designed in this way will be more efficient and more reliable. The new techniques of visualization, and especially new simulation techniques, will open completely new ways for social and political processes in architecture. The decision about demolition and or the construction of new structure in a public domain will be easily available for a public debate. Multiple options can be simulated and discussed. Prospective architectural decisions can be articulated and disseminated as never before.

My work attempts to add another aspect to this vision. I would like to emphasize that any technology has a tendency to foreground what it does best. Architecture should be acknowledged, however, for the complexity of its functioning. Parallel to the development of all the techniques that are directly derived from the new technical capabilities of digital technology, there is a constant need to study these aspects of architecture which can never be "prompted" by new technologies. As my research lead me to believe and the two compositions may suggest, digital technologies can be used to explore the modes of knowing architecture which have been in the domain of history, theory, or representation. Though less efficient or profitable, when integrated into these modes of knowing architecture, digital technology will be a potent tool for investigating that which always was central for the creation of architecture—the interplay between architectural form and human thought.

NOTES

[1] Jean-François Lyotard, "Matter and Time" in *The Inhuman, Reflections on Time*, trans. Geoffrey Bennington and Rachel Bowlby, (Stanford, CA.: Stanford University Press, 1991), p. 42.

[2] This research was supported by the University of Minnesota Graduate School Grant-in-Aid, Graduate School and McKnight Foundation Summer Grants, Department of Architecture, and by the technical expertise of Procolor Professional Color Services Inc. in Minneapolis.

[3] This collection of images, organized as a traveling exhibition, will be available for schools of architecture which would like to host it.

[4] This representational function of rationally constructed space may seen as related to the discovery of perspective by Brunelleschi. In his The Origin of Perspective, Hubert Damisch referred to Brunelleschi as "[a]n architect [...] for whom the problem of architecture was inseparable from that of representation and the problem of the representation of architecture inseparable from that of the architecture of representation, insofar as this latter can be formulated in terms of *construction.*" Hubert Damisch, *The Origin of Perspective*, (Cambridge, MS.: The MIT Press, 1994), p. 61.

[5] See, for example, Schele, Linda and Freidel, David, *A Forest of Kings, The Untold Story of the Ancient Maya* (New York, N. Y.: William Morrow and Company, Inc., 1990), pp. 66-7.