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Infotecture :
Space as Void, Solid and Activity Information

Cyber plaza by the central Artery Tunnel, Boston,
Massachusetts, USA. 2005

by Hyunjoon Yoo
Bachelor of Science in Architecture
Yonsei University
Seoul, Korea
Feb, 1992

Submitted to the Department of Architecture
in partial fulfillment of the requirement for the degree
Master in Architecture at the
Massachusetts Institute of Technology
Feb, 1997

Signature of the Author
Hyunjoon Yoo
Department of Architecture
Jan 16, 1997

Certified by
Takehiko Nagakura
Assistant Professor of Design and Computation
Thesis Supervisor

Accepted by
Andrew Scott
Chairman
Department Committee for Graduate Studies
Associate Professor of Architecture

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MAR 26 1997

Readers

Ritsuko Taho, Associate Professor in the Visual Arts
Andrew Scott, Associate Professor of Architecture

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Abstract

This thesis is a formation of a new viewpoint to perceive architectural space. It opens up a new possibility of designing architecture as information. Designing architecture does not mean designing the mass, but designing the people's perception. Human intelligence is an information process, and perceiving the space is also a brain work of information process.

I propose three different kinds of information to construct the space in people's perception, namely, that of void, solid and activity information. Void information is the changing distance between the eye and solid mass in every direction. It can be quantified through an objective method in the form of graphs. Solid information is the meaning of something visible. Activity information is the meaning of human activities.

Void information is an invisible vessel to contain solid and activity information. It can only be seen through the reflection of the solid mass. Visualization of the distances between the eye and solid mass helps us to see the characteristics of the void information.

My design project exists in people's mind. Although my project locates in a physical place, Boston, I've made an effort to design the people's perception rather than the physicality of space. My attempt to design a perception of this space was accomplished by utilizing the light in combination with the material of the skin. The space is altered by the changing conditions of light on the building skin which has various functions.

Contents

	Title Page	
	Abstract	
	Contents	
	Acknowledgment	
1.00	How to Perceive Three Dimensional Space	1-4
2.00	Space as Void, Solid and Activity Information	5-10
	2.01 Void Information	
	2.02 Solid Information	
	2.03 Activity Information	
3.00	Void Information Visualization of Gothic and Far-eastern Architecture	11-14
4.00	How to Perceive Visual Information	15-18
5.00	Historical Context of Perceptual Paradigm	19
6.00	Architectural Context of "Infotecture"	20
7.00	Design Project	21-28
8.00	Conclusion	29
9.00	Bibliography	30

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MIT gave me a world vision through China workshop, Taipei studio, and Peru workshop, and academic stimulation, not only in architecture, but also in the other departments at MIT.

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above all these, thanks

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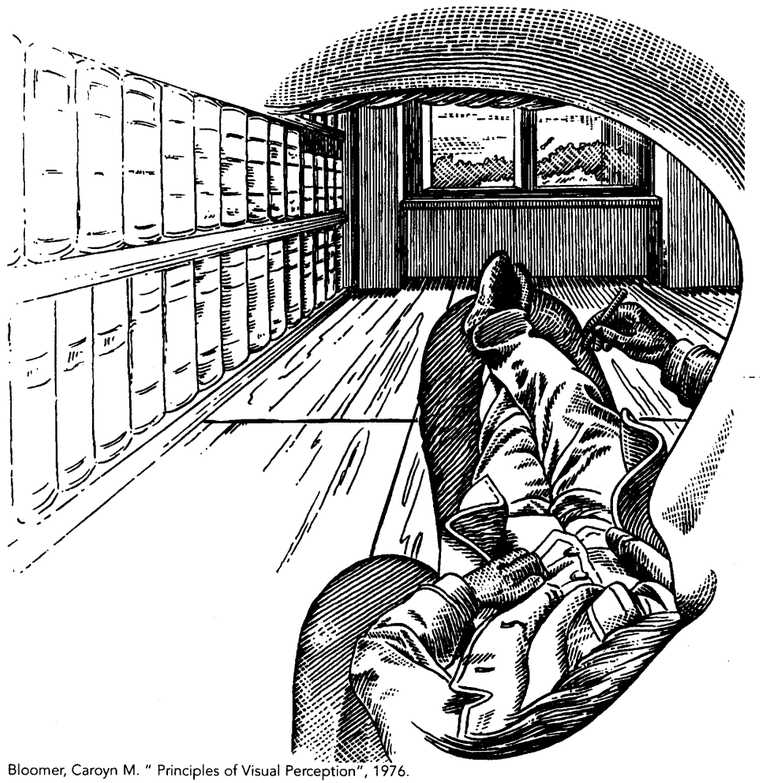
To my mother for always encouraging me, and
your effort to educate me,
To my father for showing the way of living, I'm really proud of and love both of you.
To my brother and sister in law for their love and friendship.
Without their concern I cannot be here. God bless all of you.

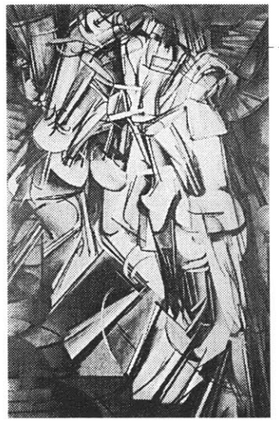


Bloomer, Caroyn M. " Principles of Visual Perception", 1976.

1.01 How to Perceive Three Dimensional Space

Time and memory enable people to recognize the three dimensional space. We usually think that space is in three dimension (3-D). We are 3-D beings. Logically, N dimensional being can recognize only N-1 dimensional being. Which means that human cannot recognize the 3-D space as a 3-D being. Yet we can still perceive the space, by saving the images of the past to construct a final 3-D picture in our minds.

Therefore, in our brain, we are 4-D beings, because we can see the space by the help of a forth dimension time and memory. But actually we can see the space at one time, because we have two eyes. Two eyes collect two images at one time, which enable people see 3-D. Even one eye can recognize the space a little bit. According to Irvin Rock, it is because we have experiences and shadow.



Marcel Duchamp. Nude Descending a Staircase, 1912. Two-dimensional painting begins to represent not three, but four-dimensions to show three-dimensional being ; it include that of time.

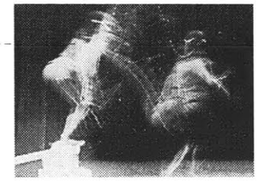


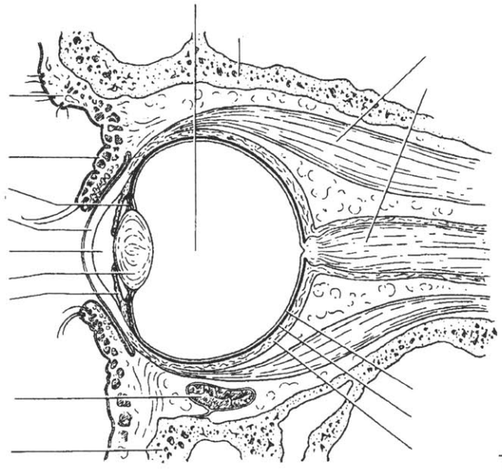
Photo of fencing game,
"Marcel Duchamp's Traveler's Box"
Photography technology catch the time of the 3-D object.

space on the cartoon screen. Our brain can fill the interval between 1/16 second and 2/16 second. Comic book has longer interval, and cyber-space inside computer network has bigger interval.

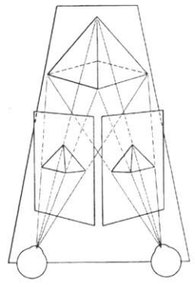
Reality is made of all kinds of information. Our brain usually has 500Hz speed in processing information, and 1000Hz speed when we concentrate on something. 1000Hz means that we can process 1000 information each second. Which is like seeing a 1000 frames of cartoon a second in real life. Also we have other kinds of information besides visual information in reality. That is why it seems real.

I am going to talk only about the visual information in my thesis. We can use many kinds of information, such as vision, sound, wind, and smell etc. to construct the space. We collect all the information by using 4 sensors ; eye, nose, ear, and skin. When it comes to sound, we can see how effective the THX surround speaker system in the theater in giving us a realistic experience. Smell and wind do same job as well. But most dominant effect comes from the visual information. According to some scientific research result, human beings spend more than 70% out of total energy consumption for information processing. This data shows how dominant the visual information is in human experience.

We collect only 2-D visual information caught on the 2-D retina. This information goes into our brain by electric signals. And through the time, we construct a 3-D space by putting together such 2-D information. We have this kind of experience when we watch the cartoon. Cartoon has 16 frames a second. Each frame is just a 2-D painting. But we can see the

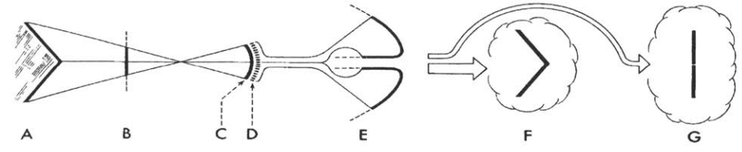


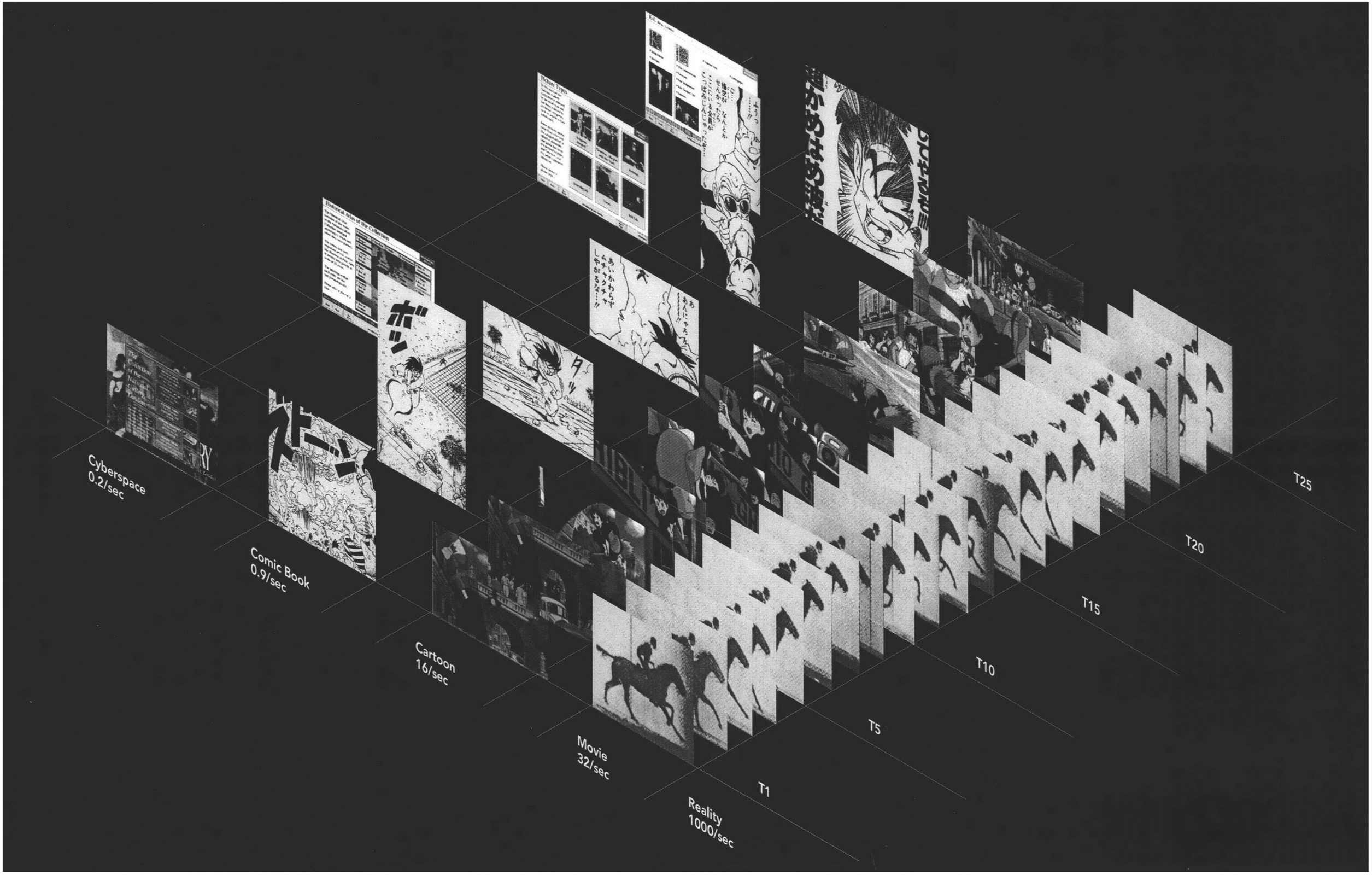
"Autopsy of human eye", Gibson, James. "The perception of the Visual World", 1950.
The retina is 2-D surface. The information caught by the retina should be 2-D information.

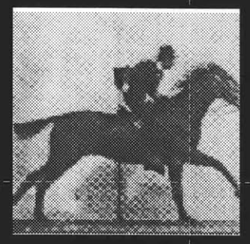


"Construcion of the 3-D vision", Gibson, James.
"The perception of the Visual World", 1950.
Two eyes enable people to exist at two location at one time

There are two factors that define the space. One is the semantic of each frame picture, and the other is the syntax of perspective changes. The meaning of each picture is defined by people's past experiences. (I will talk about this issue in Chapter four, how to perceive visual information.) And such meaning is affected by the order of pictures. The inter-relation between information is as much important as information itself. In the coming analysis, I chose a certain speed and path which I thought was the most effective way to show the feature of that space.




Cyberspace
0.2/sec
Comic Book
0.9/sec
Cartoon
16/sec
Movie
32/sec
Reality
1000/sec
T1
T5
T10
T15
T20
T25



Horse Galloping:
Daisy with Rider

by Eadweard Muybridge

movie has 32 frame per each second. Each picture has a certain 2D visual information. These information goes into the brain and turn into 3D illusion. Our brain usually process 500 frames a second in common situation, and 100 frames a second in concentration situation. The brain fills out the gap between pictures.

Kiki's Delivery Service

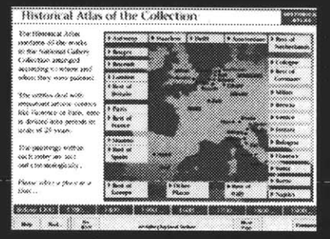
by Miyazaki Hayao

16 frames a second images projected in cartoon movie. It allows the cartoon charecters to move freely as in real life.

Dragon Ball

by Doriyama Akira

comic book is more interactive than cartoon or movie. Because the picture processing speed is decided by readers. All the images are 2D but people can get a space notion from those images and construct 3D space notion.



Mircosoft:
'Art Gallery'

by Mircosoft

Cyber space is the first 100% artificial world made of pure information. All we have is 2D information on the screen, but though time, people get a notion of 3D space. Navigating the network is making of personal space.

2.01 Space as Void, Solid, and Activity Information : case study of Chapel on the Mt. Rokko by Tadao Ando

2.01 Void information

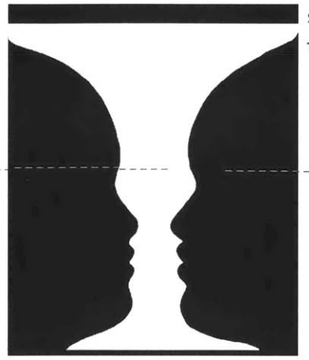
Void information is data of distances from the eye and solid mass in every direction. I chose 38 directions to measure the distances, and a certain route to show the space character efficiently. Then I chose a certain interval to measure the distances. Such speed is very similar to that of average walking speed of human beings. Of course people can stop at some point to think about the more closely, or they can turn their head to see something more carefully. This method that I made is a kind of a formula to visualize the space in an objective way.

2-D perspective contains void information inside. When you see the Andrea Pozzo's painting in Rome, it does not seem to contain any depth until you stand under the vanishing point of this painting. It has a depth on the 2-D painting when you stand under the vanishing point. This depth is the void information discussed in my thesis.

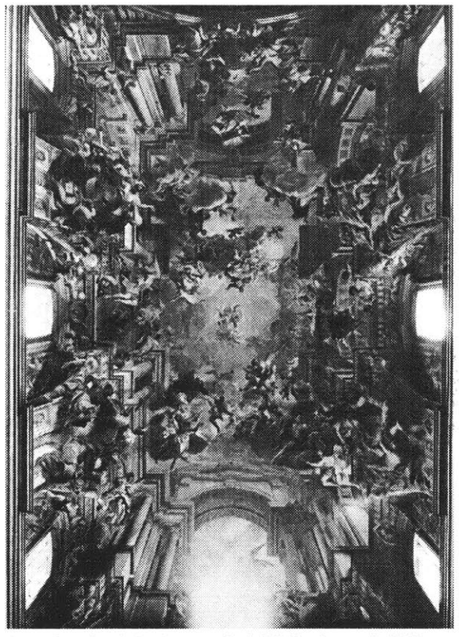
There are two different kinds of void information. One is absolute void information, and the other is relative void information.

Absolute void information is a distance measurements in 3-D. At each time, each perspective frame has its own 3-D distance mapping, void. That is the absolute. The meaning of that void space is going to be understood by the people in a very personal way. For instance, somebody might feel that he is under a tree when he is actually under an umbrella, or somebody might feel like he is in a tent in the same situation. Basically nobody can expect the meaning of an absolute void information perfectly. In void information analysis, I am dealing only with the objective analysis.

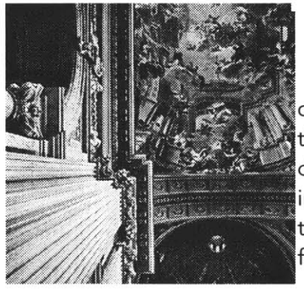
Relative void information is the changing rate between two absolute void data. You can see the importance of order in film or novel. Usually movie has a chronological order to follow the time flow. In other words, it shows yesterday's story first, then today, and then tomorrow. Yet some films have a twisted order. For instance, "Pulp Fiction (1996)" shows the 5 minute before the ending scene at the film's beginning. Such shifting of time composition changes the color of movie and made it possible to be distinguished from other film. For example, when you perceive the studio room in the order of the lawns first, and then the stone column facade of MIT, lobby, elevator, finally reaching the studio, the meaning of this space is completely different from perceiving the same room by seeing the room first, and then the lobby, elevator, stone column, and then the studio room again. Even the meaning of same studio space is different, due to the different perspective order preceding it. Such as this, the changing rate between two absolute void information is an important factor that controls the void information.



Vase & faces,
devised by E. Rubin in 1915



Anrea Pozzo's painting, Leeman Fred. "Hidden Images", 1975.
Andrea Pozzo's Barouque painting in Rome. The depth of this painting is a void information.



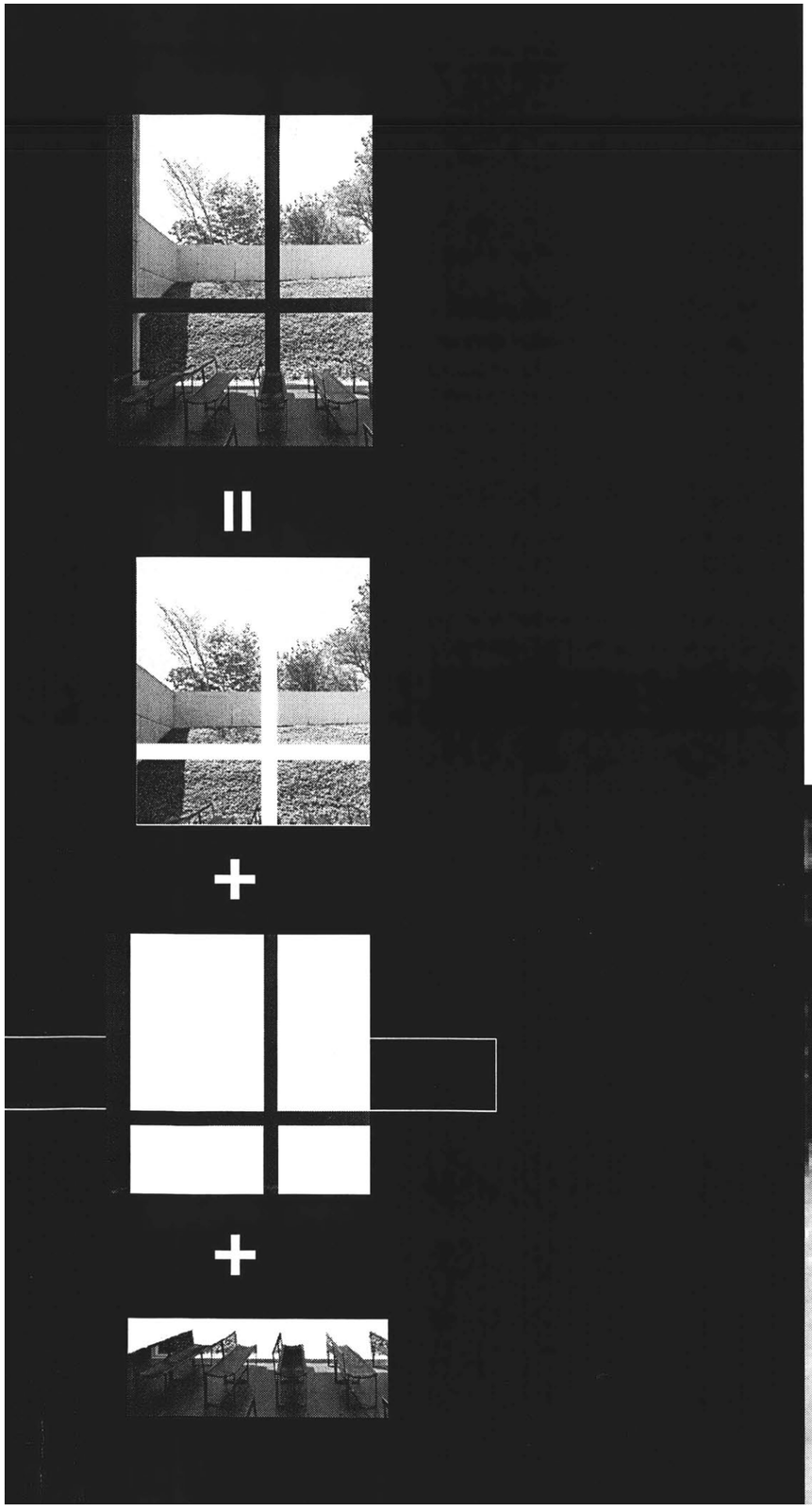
2.02 Solid information

Solid information is information of something visible. Looking at the "vase & face" drawing, you cannot see the vase and face simultaneously. Seeing the vase, you cannot see the face, and vise-versa. In this example, vase is a void information, and face is a solid information. For instance, in the Gothic cathedral, people see the sculptures as solid information, but they cannot see the void space simultaneously. They need two times to recognize different information.

The examples of solid information are paintings, sculptures, letters, landscapes, images, materials, symbols, shapes, and forms. Artists who controlled this solid information in a very distinctive way are the surrealists. The leaf in this painting has brick material. Two different solid information conflict each other in many surrealism paintings.

Solid information is very personal. Its meaning is defined by their past experiences, for instance, education. Chapter four covers this issue.

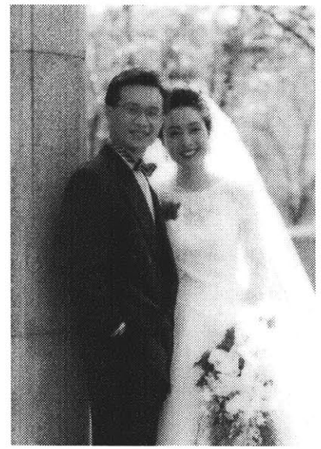
The concrete mullion of the window has a cross shape, so it appears to me as the cross of Jesus. And landscape is a major solid information to define the interior space. Chairs have very nice details, which are potential solid information in this space with the material of the chairs.

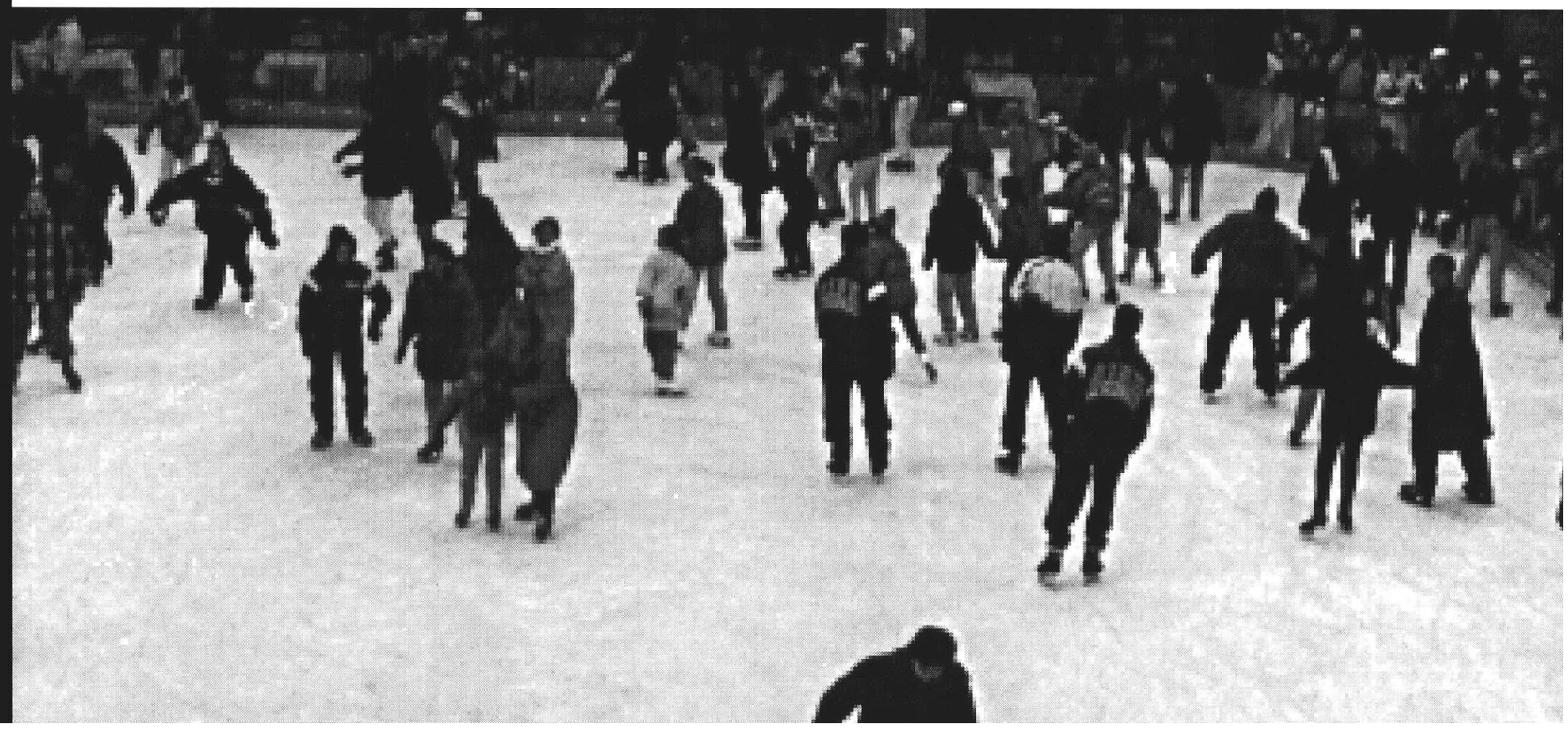


2.03 Activity information

Activity information is information of human activity. The final function of architectural design is for human activities. Space supply the void to enable human to have activities. Human activities are very unique and critical issue in architecture. Therefore, I made another directory to put these under. In the case study of the chapel on the Mt. Rokko, sunday chapel service and wedding ceremony would be the activity information.

Human activity defines the characteristics of space. For example, in the Rockefeller Center of New York City, the space in front of the building is used for a restaurant during summer, but as an ice rink during winter. Also, in Italy, the Sienna Plaza is usually just plaza, but during the festival, it becomes a horse race track. In these examples, horse race and ice skating is activity information.





Infotecture : space as void, solid, and activity information

= **void** information

The vessel to contain solid and activity information. It could be quantified. Following graphs are visualization of void information.

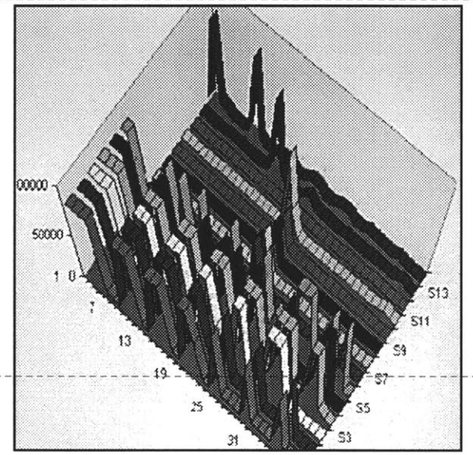
=**solid** information

Landscape, furniture, stained glass images, and sculpture etc. are the solid information.The meaning of these information are defined by people's past experiences.

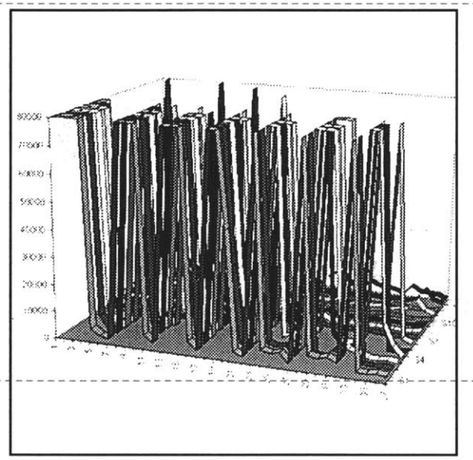
=**activity** information

Architecture is for human activities. Service or wedding ceremony in church, working people in the office building could be this kind of information.

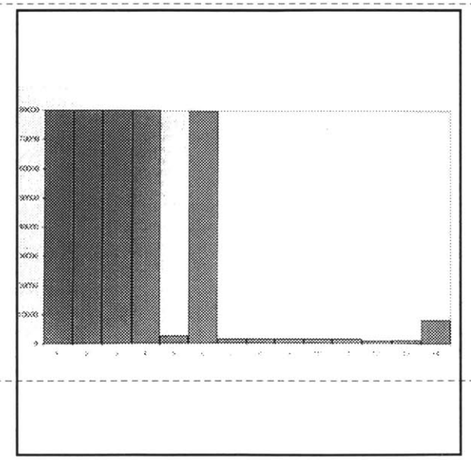
Infotecture



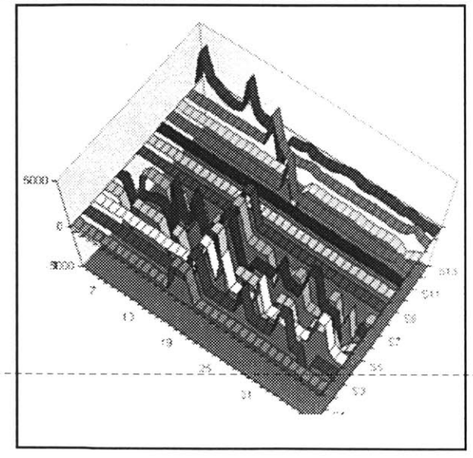
absolute void information graph through time



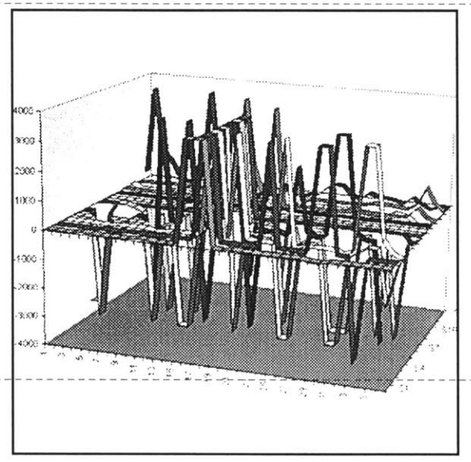
absolute void information graph from another view point



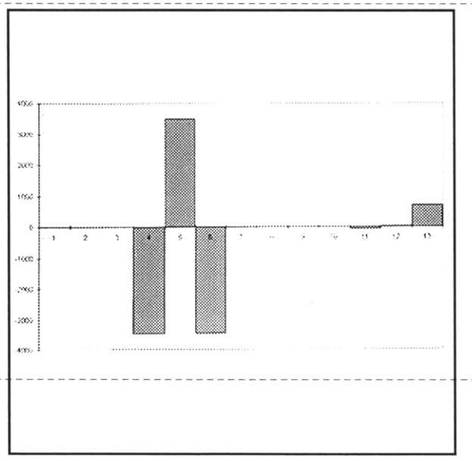
absolute void information graph of a certain direction



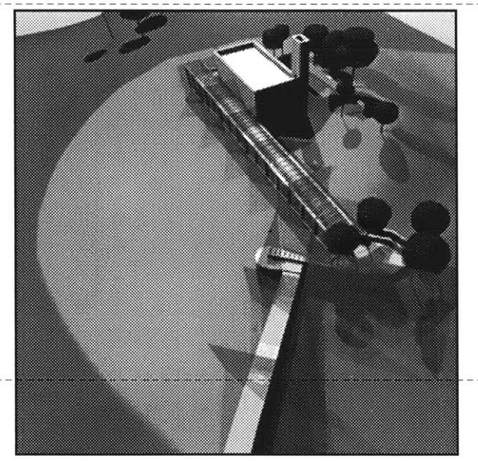
relative void information graph
relative graph shows the changing rate of the distances



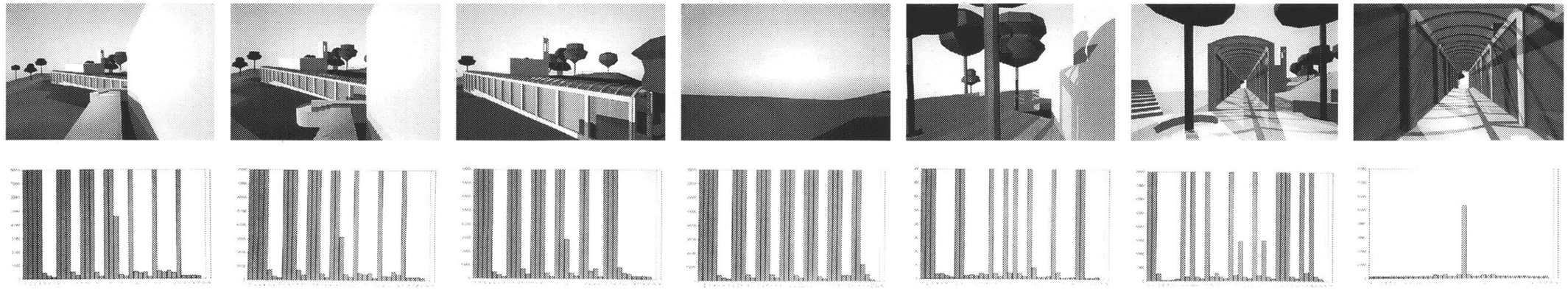
relative void information graph from another view point



relative void information graph of a certain direction



perspective showing the viewing locations

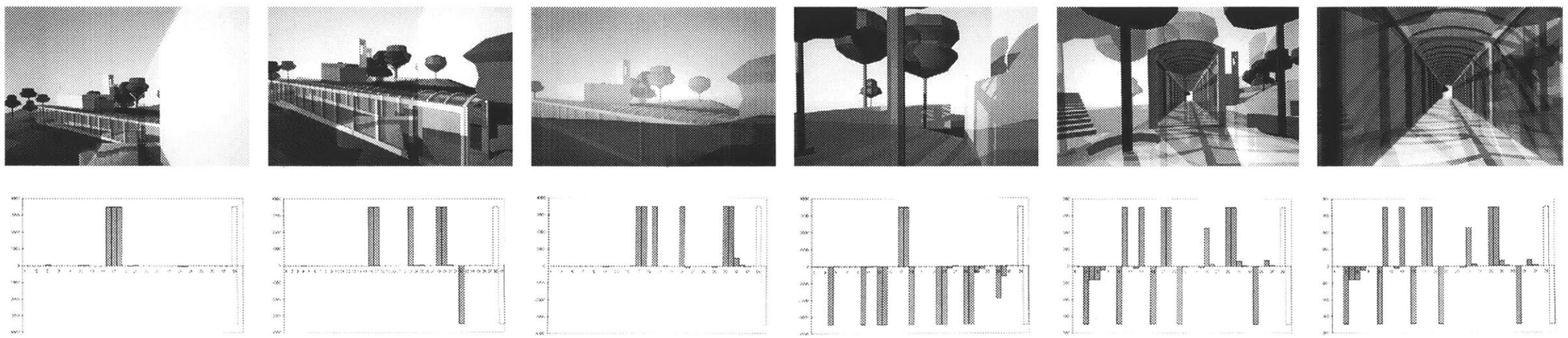


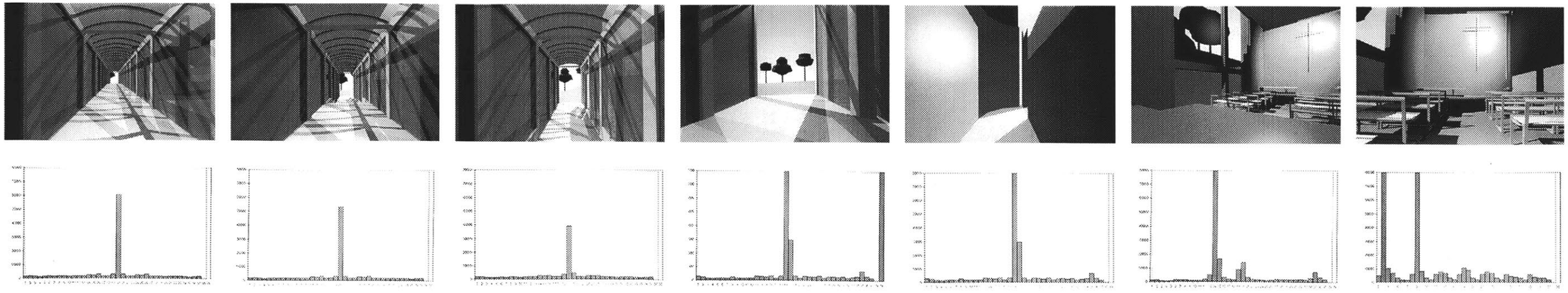
absolute void information graph

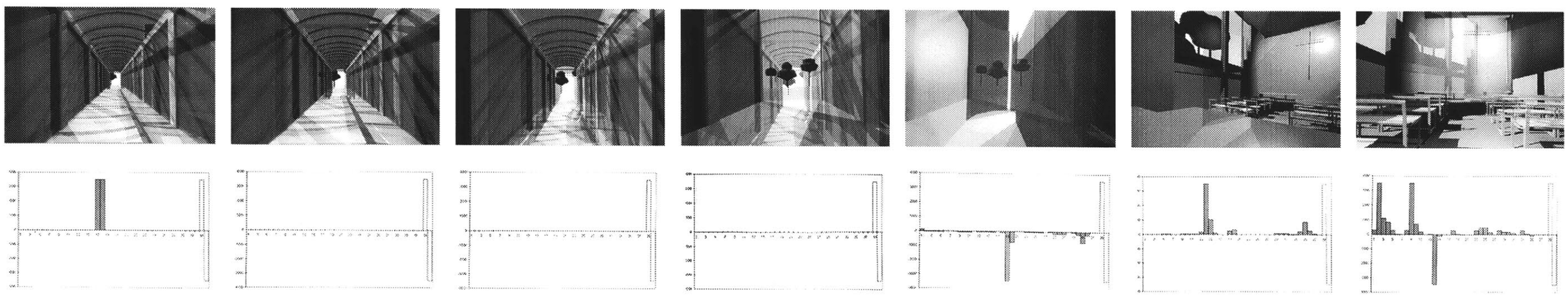
Void information analysis of Tadao Ando's chapel on the Mt. Rokko
Each graph is visualization of distances between watcher's eye and solid mass

$$R = (A (t_{n+1}) - A (t_n)) / A (t_n)$$

relative void information graph







3.00 Void Information Visualization of Gothic and Far-Eastern Architecture

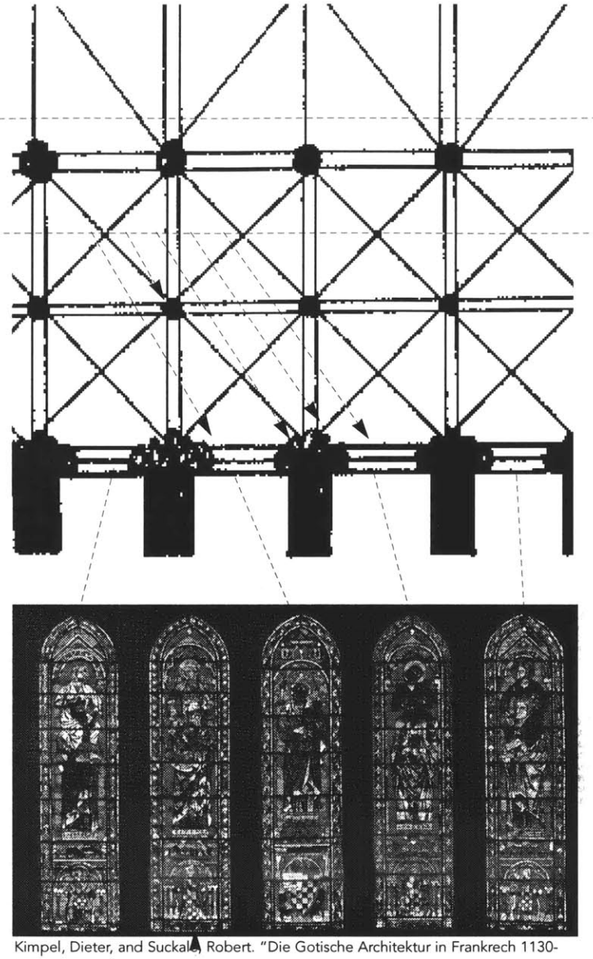
3.01 Gothic Architecture

Rhythmic pattern is shown in the Absolute Void Information Graph of Gothic architecture. I chose a direction out of uncountable possible directions. This graph is the visualization of distances between the watcher's eye and solid mass in plan, in a certain interval (approximately 2 second, interval).

This rhythm becomes a character of Gothic space. It is used to convey the bible story to the people in the church who usually couldn't read the bible at that time.

Stained glasses are the major solid information in Gothic cathedral. These solid information are located at the high pitch point of the Absolute Void Information Graph. Therefore, the void space pattern becomes a vessel to maximize the effect of solid information, stained glasses. The stained glasses are located where the relative values are altered in the Relative Void Information Graph.

De-materialization of the Gothic cathedral can be explained in terms of solid/void information language. The space experience of Gothic cathedral happens mostly during walking down the hallway, during which one has a rhythmic pattern in the void information. When this rhythm is repeated in a certain speed, people starts to concentrate on the void information changes, because what they are usually concerned with is where the changes are. According to "vase and face" theory, people cannot see the solid mass while seeing the void. Even when they see the columns, those columns are carved with full of sculptures which are solid information itself. So basically people in the Gothic cathedral cannot have time to process the notion of material, because they spend all the time to process the stories of stained glasses.

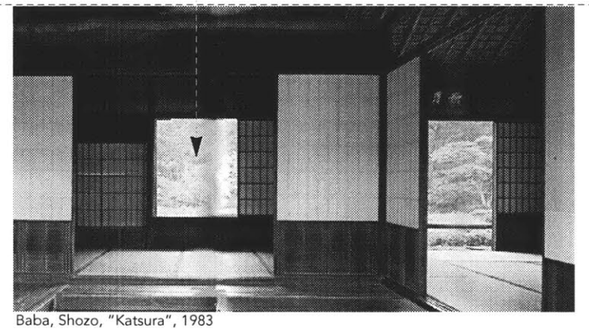


Kimpel, Dieter, and Suckale, Robert. "Die Gotische Architektur in Frankrech 1130-1270", 1985

3.02 Far-Eastern Architecture

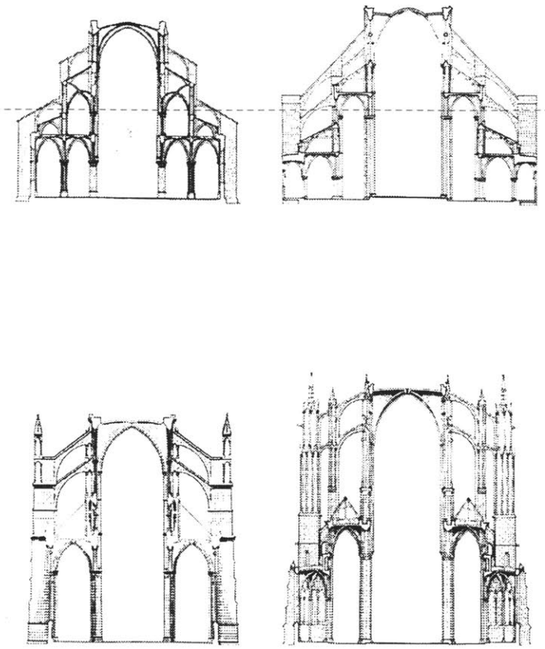
Changing of void information by the help of screen system is the main character of far-eastern architecture space. They control the solid information, landscape, by controlling the void information. There are solid information where the void information changes are, same as in the Gothic architecture.

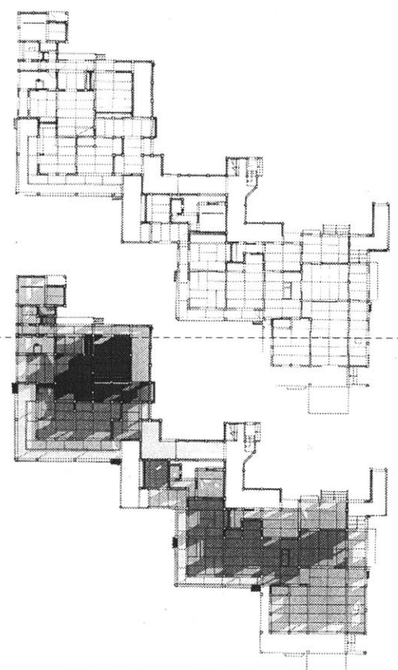
The toned area represents the amount of changes in terms of void information.



Baba, Shozo, "Katsura", 1983

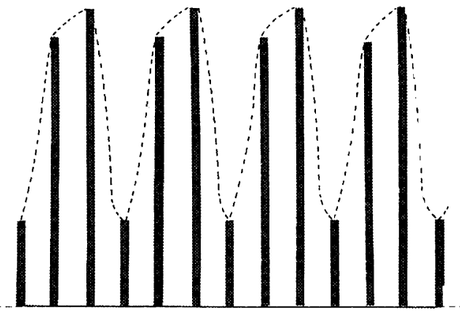
Mark, Robert. "High Gothic Structure : A Technological Reinterpretation", 1984.



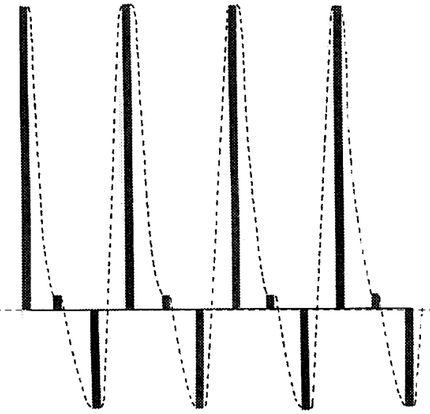


Plan of Japanese taditional architecture, Baba, Shozo, "Katsura", 1983

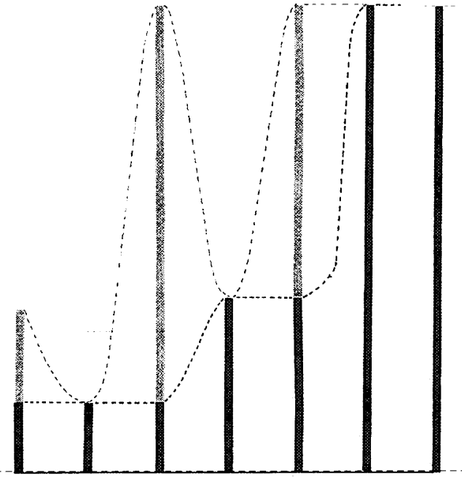
absolute void info-graph of **Notledam cathedral** in plan.
each stick represents the distance between eye and solid mass, such as columns or stained glass. Stained glass is shown at the top of tallest stick.



relative void info-graph of **Notledam cathedral**

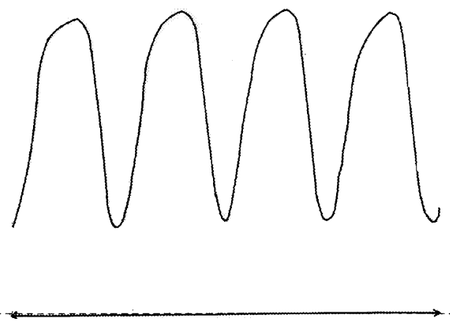


absolute void info-graph of **traditional Far-Eastern building** in plan.

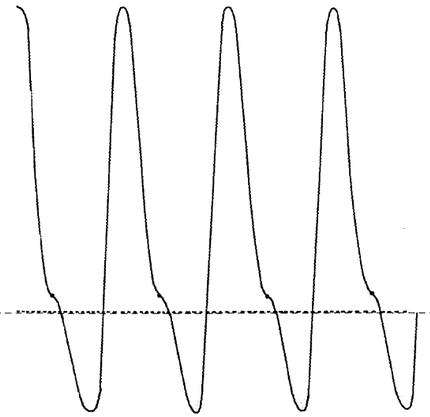


Following graphs are my analysis of three building, Gothic cathedral, far-eastern architecture, and my project's corn space. I chose the plans to show the space character clearly for Gothic and eastern architecture. And for the corn space, I analyzed in both of plan and section.

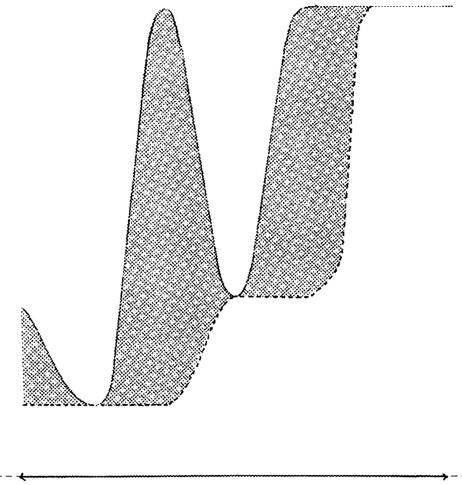
This analysis is only about the void information out of my three categories of architecture information, which are void, solid, and activity.



Rythimical pattern is seen in the analysis of Gothic architecture.

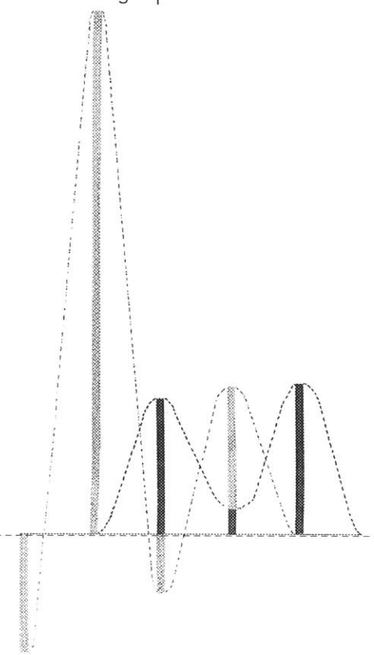


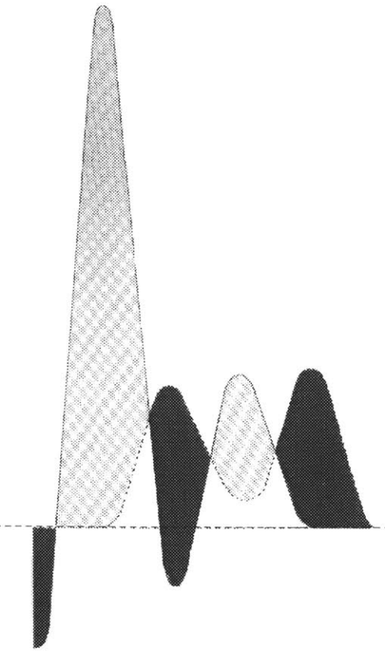
There are stained glass where relative values are altered.



Since this building has a movable screen system, the shape of void info-graph has been transformed. The screen tone area represents the amount of changes.

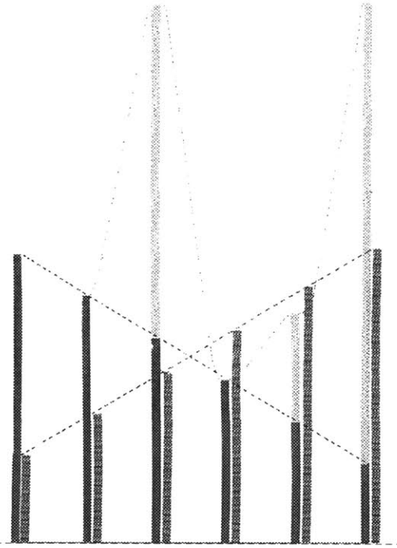
relative void info-graph of **traditional Far-Eastern Asian** building in plan

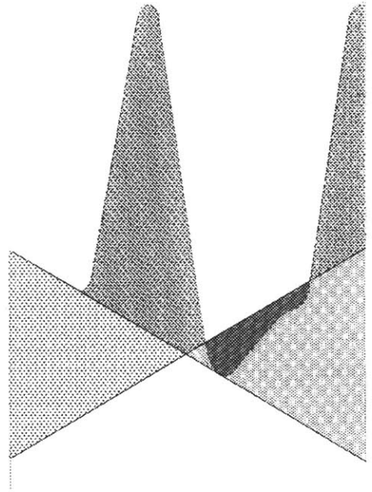




The screen system can make both positive and negative changes.

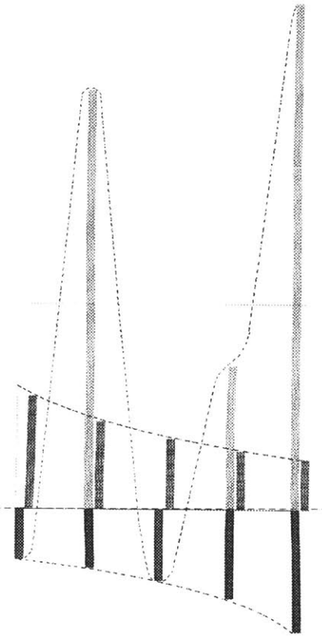
absolute void info-graph of **corn space** in my project

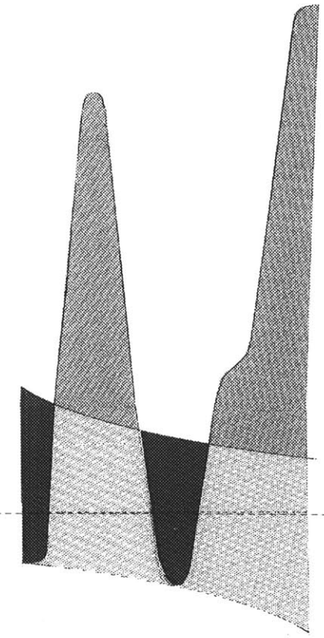




There are crescendo in section and decrescendo in plan. The lighting situation changes the dimension of space.

relative void info-graph of **corn space**





Straight lines of absolute graph are changed into curve.

4.00 How to Perceive Visual Information

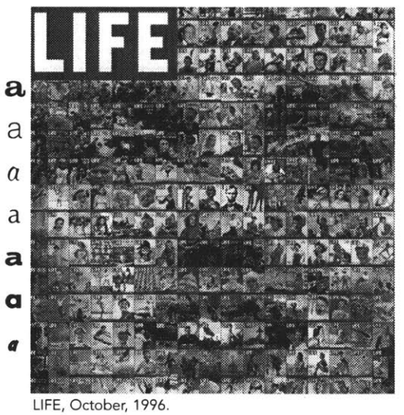
4.01 Past experiences define the meaning of visual information.
When I was in Taipei with MIT students, American students were fascinated by the neon sign of Taipei city. But I was not. That is because American students do not know Chinese characters, therefore they see Art Nouveau decoration from those neon signs. But for me it was just over loaded information, because I studied Chinese characters since I was very young. The same case holds in Las Vegas. American people usually don't like the neon signs of Las Vegas. But I am fascinated by those neon signs as a person who doesn't speak English as a first language.

Hong Kong street view, Hurlinmann, Martin. " Hong Kong", 1962.

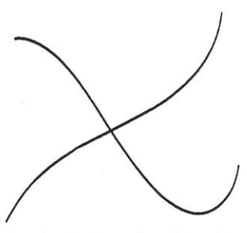
Las Vegas street view, Hess, Alan. "Viva Las Vegas : After-Hour Architecture", 1993.

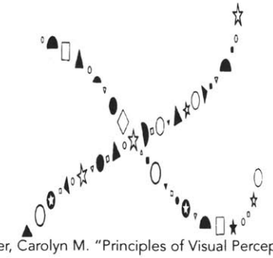
4.02 People's interest defines the meaning of information.
To explain this, I would like to take an example of following cases. When you see "a"s in the picture, all of them look different from one another in terms of typology. But at the same time it has a same meaning of "a". If you are interested in the typological information, those are all different information. However, if you are interested in the meaning of the word, you would not find any differences between them.

Nelson, George. "How to See", 1977.



LIFE, October, 1996.

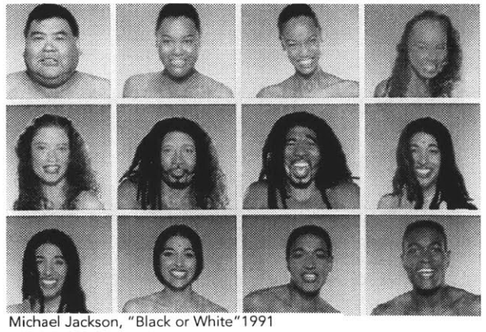

Bloomer, Carolyn M. "Principles of Visual Perception", 1976.


Bloomer, Carolyn M. "Principles of Visual Perception", 1976.

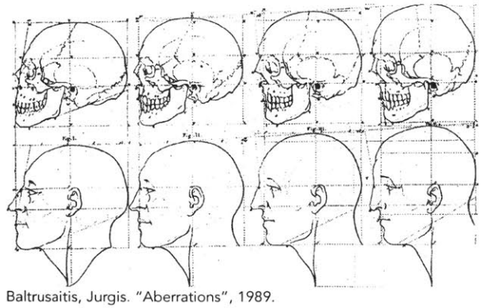
4.03 Visual information has analogic boundary.
In another example, nobody can say that this face is of a black man or that of a white woman in Michael Jackson's music video, "Black or White".

4.04 Several features define the whole meaning of information.
When we recall somebody's face, we don't remember every single detail of it. Likewise in some computer program, we don't necessarily save people's face information in pixles, but maybe in points and vectors. It is a difference in a Photoshop and an Autocad. Photoshop program saves every point of the picture, that we call pixle. That is why we can correct a very small spot separately. But in the Autocad program, drawings are saved in points and vectors. I think sometimes our brain works like an Autocad program. Seeing the figure of Gandhi and somebody's face, you might not figure out who the other guy is. That guy in the up side down picture is Paul Mechatni who is one of the most recognized face in the world. However, it is difficult to recognize his face when the picture is turned upside down. This is because in people's memory, his face was memorized by some features of lines and vectors. On the other hand, we can easily see Gandhi's face with the help of several lines describing his face and Indian architecture.

Such is the case in all paintings. After the invention of photograph, modern painting changed its direction toward the perceptual value. Realistic description was perfectly achieved by photographic technique. Therefore, they started to paint impressionism and then cubism movements. For example, in the paintings of a church done by one artist through time, you can see that his understanding of the same object has changed while he had been changed himself.



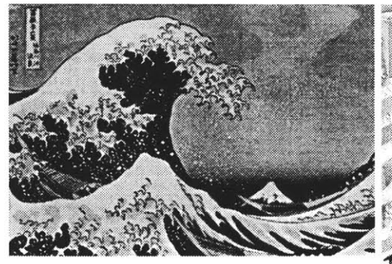
Michael Jackson, "Black or White"1991

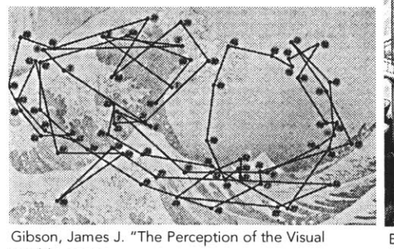


Baltrusaitis, Jurgis. "Aberrations", 1989.

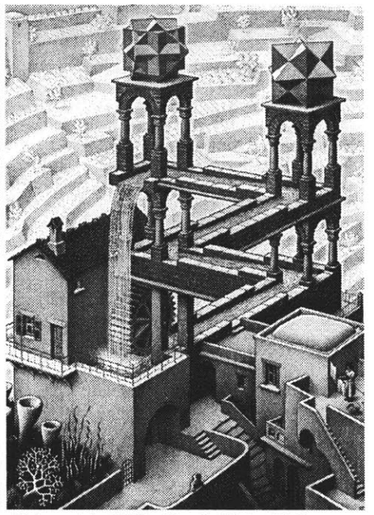
4.05 One information can be collected at a time.

Seeing the Hokusai's wave picture with lines, you can see how our eye moves to perceive something. It is like a drawing of vector lines. When we look over something, our eye stops at some featuring points to save some information, and these information go into the brain to construct one perception. It is just like a puzzle. Small pieces of puzzle are collected by the process of looking it over, and those pieces are assembled in the brain during the process. Due to this process, we have some illusionistic picture. The relationships between some elements in the other Escher's painting are right. Yet the whole picture doesn't make any sense. Why? Because we can only see one information at one time.



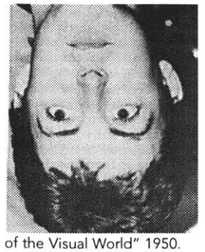


Gibson, James J. "The Perception of the Visual World", 1950.



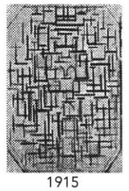
Brigham, John E." The Graphic Work of M.C. Escher", 1960

Baltrusaitis, Jurgis. "Aberrations", 1989.

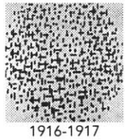


Gibson, James. "Perception of the Visual World" 1950.

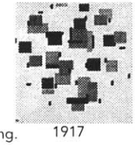
1914



1915



1916-1917

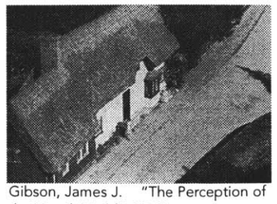


Max. Frankel's painting. 1917

4.06 Elements of the picture define the meaning of information.

Composition is very important to visual art. When I see the movie, I personally think that camera work is very important to communicate what the movie is about, not to mention that of photography and paintings. Let's take a look at a perspective of a fruit dish. A dish with an apple cannot be the same as a dish with bananas, apples and oranges. In the dish with bananas, apples and oranges, the distance between the fruits are a critical factor to define the character of the dish. Like this example, when you see something in reality, each perspective has its own elements and relationships. And these sequential perspectives become a space in our brain according to my hypothesis.
The picture of Time magazine's advertisement demonstrates such elements of perspective. If just the face of Bob Dole is printed on the cover, he seems to be thinking about serious political issues. But when the picture includes the dog as well, the title should be changed from "Bob thinking of presidential election" into "Bob playing with a dog in his office".

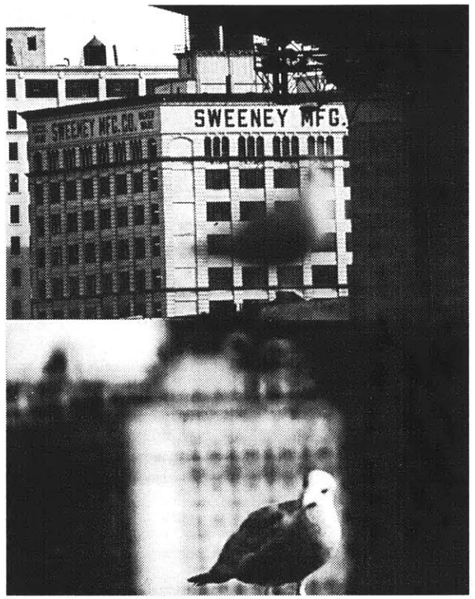
TIME, October 21, 1996



Gibson, James J. "The Perception of the Visual World", 1950.

4.07 Focus defines the meaning of information.

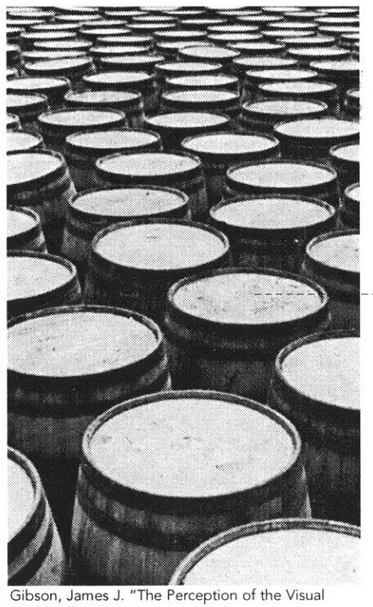
As I said in the paragraph 4.05, we can collect one information at one time, because we can look at one thing at a time. In this picture, if our focus is on the bird, this picture is about the bird. But if we look at the building in the back, the space becomes bigger and this picture is about the building. From the same angle, we can collect several different information by changing the focus.



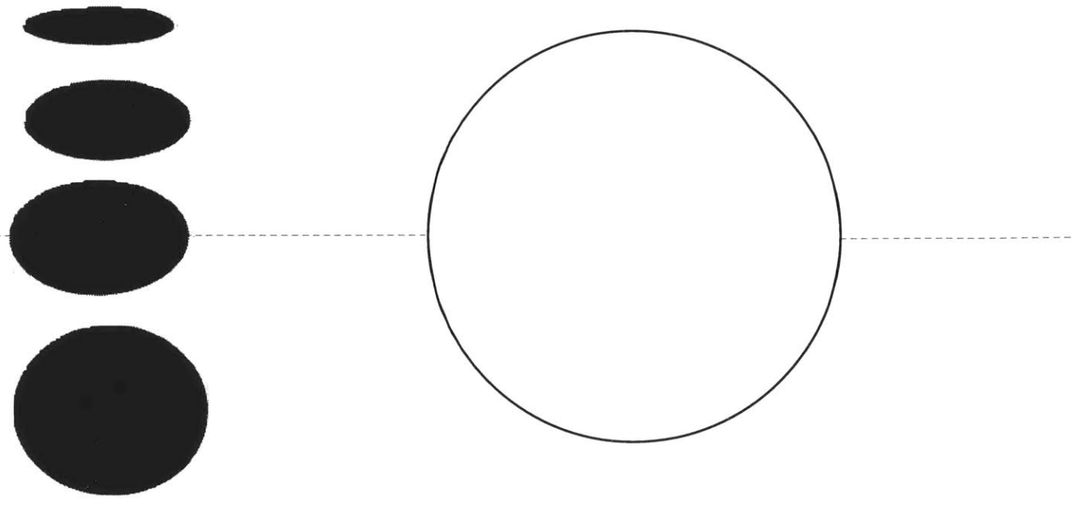
Nelson, George. "Hoe to See", 1977.

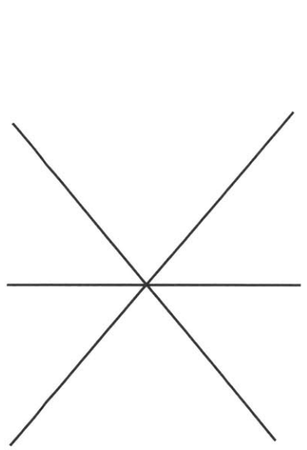
4.08 People can appreciate omniscient information from the individual perspectives.

Seeing the drums in the picture, we see the ellipse of the top of these drums. Yet we can also perceive a circle out of the ellipse. This is what we do to understand architecture. Like the perception of a person's face, we perceive some values of architecture in vectors and geometry. Comparing the pictures of Gothic cathedrals and Louis Kahn's building in perspectives, both pictures look very similar, because of the similar geometric composition of the perspective. Circle geometry is used in both spaces, and that information of circle is perceived by the people's omniscient perception. Just like Gandhi's portrait, geometric features constructs the essence of the space. Therefore, we can see a similar space.

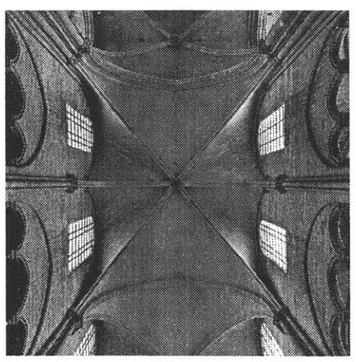


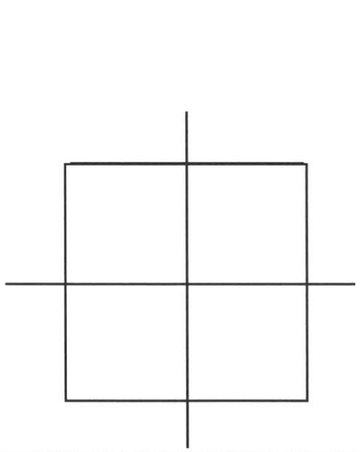
Gibson, James J. "The Perception of the Visual World", 1950.



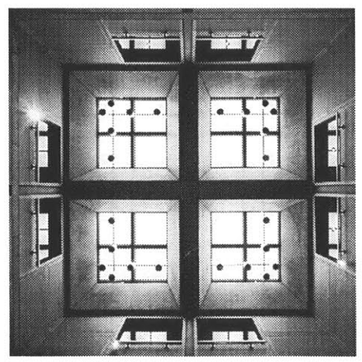


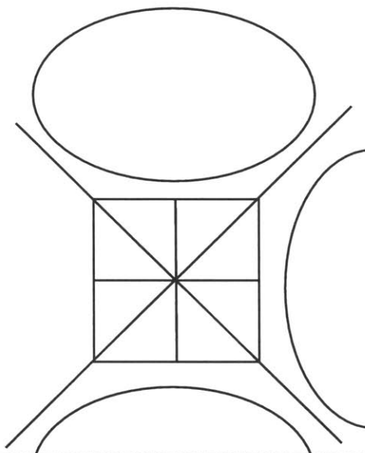
Gothic Cathedral.



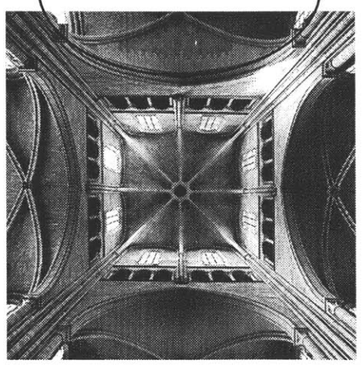


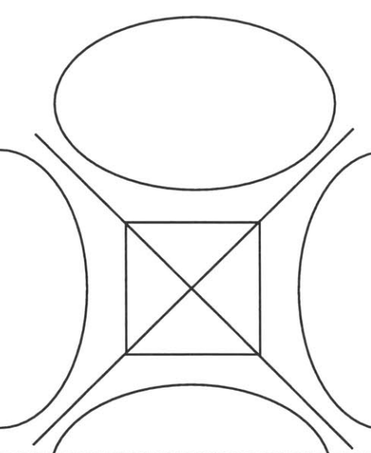
Louis I. Kahn : Yale British Art Museum 1969-77



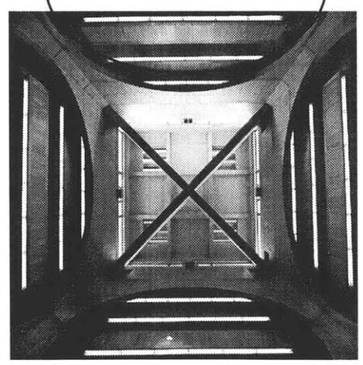


Gothic Cathedral





Louis I. Kahn : Exter Library 1965-72



5.00 Historical Context of Perceptual Paradigm

New colonization era of the world started with the sail route discovery in Europe and America by Columbus, in 1492. The era between 15th and 20th century is driven by the "object" paradigm, which people think of the world as a set of objects. It makes people think that they can conquer the nature and use them up, even other races and countries.

World War II is a symbolic event in this paradigm. Nationalism of the 20th century, and the political support for this paradigm led to this world war. The rulers of the empires promised their people to bring profit from the other countries in return for their royalty.

The 20th century paradigm is divided into two periods by the Hiroshima atomic bombard. The war ended with the symbol of a new paradigm, the atomic bomb. There had been important changes in a human perspective at the end of the 19th century. I dare to say that Freud, Guedel and Heisenberg are the people who opened the new paradigm. Based on Thomas S. Kuhn's idea, the paradigm caused them to create a new concept in understanding of the world. I don't want to argue about which one is first. What I want to talk about is the changes of perspective of common people.

Einstein's relativism didn't affect the lives of the common people then. It was just a radical and critical scientific theory until the Hiroshima bombardment. But after it, people saw the phenomenological proof of the relativism. People's paradigm has been changed after the Hiroshima bombard.

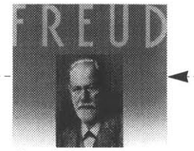
Universe and human mind is two new potential territories to be discovered after the end of the colonization era. One lies outside us, and the other inside.

The U.S.S.R. and the U.S.A., two major empires of both sides used universe exploration as a vision of their future. They need a new vision as a propaganda during the serious Cold War. The U.S.S.R. launched the first satellite into the orbit, and the U.S.A. sent the first man on the moon, in 1969.

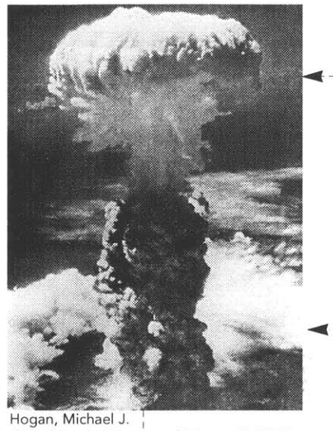
While the universe exploration is going on, computer was invented at the beginning of the 1950's. Computer software which is strongly connected to linguistics theory and human intelligence has been developed rapidly.

The universe exploration has been faded since the end of the Cold War, for this fantasy of the universe exploration has been mainly used for the political reason during the Cold War. It is also because of its long term benefit gain and the lack of non-commercial profit ability. Computer industry was left as a major target. Nobody can deny that the computer industry is a lion's
share in a capitalist industry. Its technology is directly connected with the

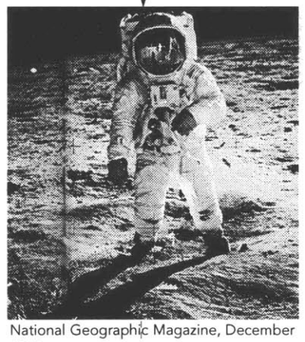
"Discovery of Cloumbus"Tooley, R. V. "A history of Cartography : 2500 Years of Maps and Mapmakers", 1969.



Freud, Sigmund. "General Selection from the Works of SIGMUND FREUD", 1957.



Hogan, Michael J. "Hiroshima in History and Memory", 1996.



National Geographic Magazine, December 1969.

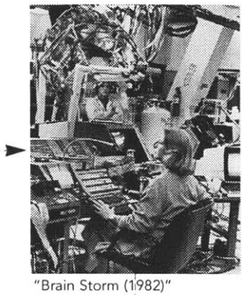
country's power (maybe I have to say "company" instead of "country". Surely a company is more and more important than the country in a modern world. According to Alvin Toffler, most powerful group in the next century would be a company not a country. For example, note the prominent influence of the Microsoft , Honda, and AT&T.)

De-materialization has been achieved in the information-oriented world. Nowadays everybody has a credit card. It was not as familiar to the public 10 years ago. A hundred years ago, nobody thought that this piece of plastic will replace the heavy coins and bills. We still have cash, but in our notion of money, it is not the weight of money anymore. The numbers in your bank account is far more important. People understand the world in a non-material notion more and more. If you look at the dictionary and compare the numbers of words to explain material things and non-material notions, you will see how much of our thoughts are constructed with the non-material notions.

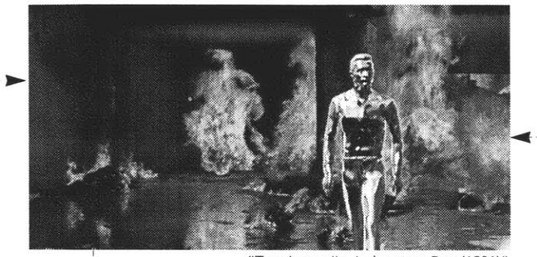
Hollywood movies have been instrumental to make people have new paradigm. In 1991, people were fascinated by the special effect shown in the film " Terminator II ; Judgment Day", directed by James Cameroon. This is the first film which has a virtual character, T1000. People saw a very realistic liquid metal robot on the screen, but it is not real. What you see is not what it is anymore, if we don't know what it is exactly. Where is the value? The value of the perception has been more important than ever before. Personally, this special effect in T2 is important almost as much as the Hiroshima bomb. However, even before this event, the importance of perception has been evident in the mass media for a long time. Impressionism is one movement of perception in fine art.s Many movies and dramas, such as "Back to the Future" and "Moonlighting" have challenged the conventional time-space notion as a critical post-modern movement. A milestone film in the perceptual context, the film, " Brazil (1982)" is a good example. At the last scene of this film, the main character is tortured in the physical world while he is separated from the pain, by being in the metaphysical world with the girl of his dream. Should we place our value in the physical or the perceptual world? The same thing happens in the novel of " Hard-boiled Wonderland and End of the World" by Haruki Murakami (1991).

This paradigm assumes space as a brain construction out of perceived information. According to Mitchell W. Schwarzer, people started to see architecture in terms of space since the end of 19th century. I would like to question what the definition of space is in his article. Didn't the Asian people who built houses in the 15th century think about space? They did think about space. But the concept of space was different to in other era. During some era, people thought the geometry of elevation is more important than the shape of void space to construct the "space".

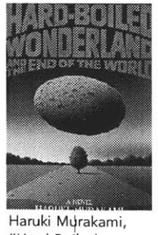
Bay Bank account sheet.



"Brain Storm (1982)"
Cinefax, October, 1983.



"Terminator II : Judgement Day (1991)"



Haruki Murakami,
"Hard-Boiled
Wonderland and the
End of the World
(1991)"

6.00 Architectural Context of "Infotecture"

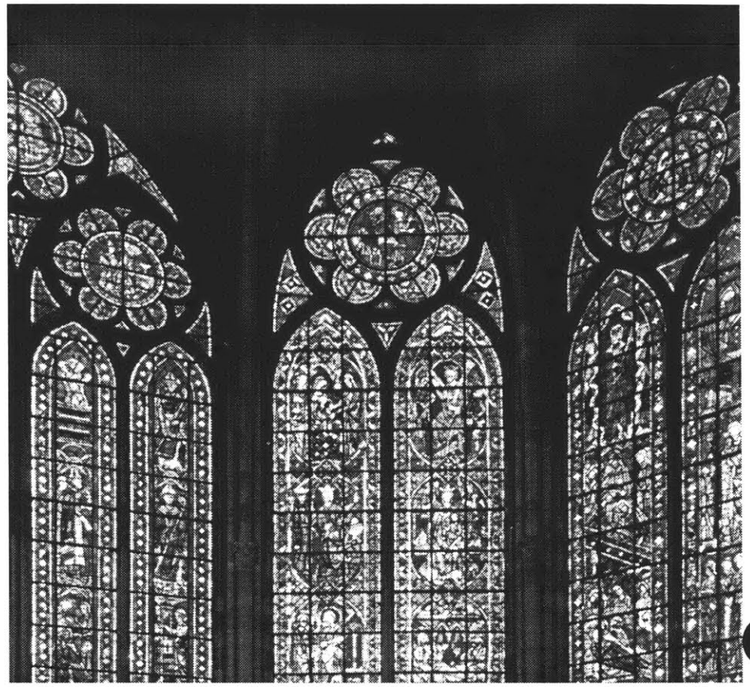
In the past, architecture used image information to construct space. Gothic cathedral is a good example. Stained glass, sculptures and paintings are information to construct the cathedral space. The void information pattern works like music, and the solid information is the lyric of the song of architecture.

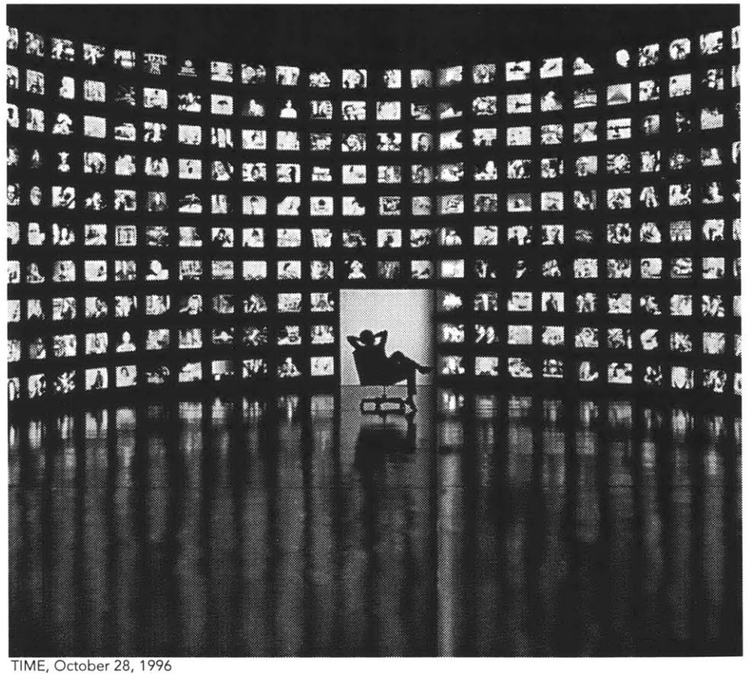
Media technology has replaced the solid information part of architecture. Gothic stained glass turned into a TV in your living room, and the echo in the high ceiling church has been replaced by the stereo. Solid information that used to be a part of space is now replace by books, magazines, TV, and stereos.

In my project, I tried to bring back media information into my design. Projected images, scene of traffic, and silhouettes of the people on the corn surface are the solid information I used.

I was thinking of the overlapping effect in an image projection. This architecture is located in Boston, Massachusetts, in USA, and the image of the Great Wall in China is projected on the screen. I was wondering what kind of space it makes. Most of solid information is China, but the physical space is Boston.

Kimpel, Dieter, and Suckale, Robert. "Die Gotische Architektur in Frankrech 1130-1270", 1985





TIME, October 28, 1996

7.00 Project

title : Cyber plaza by the Central Artery Tunnel, Boston, Massachusetts, USA.
site : between Quincy Market and Marriot hotel of Water Front
program : cyber plaza, virtual office, circulation core, parking, screen.

7.01 site context

The present Central Artery will turn into Central Artery Tunnel by AD 2005. This site is the intersection of Quincy / Water front axis and Central Artery Park axis. City of Boston will have the free site along the present artery highway above the ground. This site will be mostly turned into a park to serve as a major greenery of Boston.

7.02 Why the corn shape space

Based on the analysis of two architecture ; Gothic and Far-Eastern, corn shape void space was generated. Compared to other two void space, corn has a crescendo in section, and de-crescendo in plan in void information. This crescendo / de-crescendo void becomes a referent void.

7.03 How to transform the space

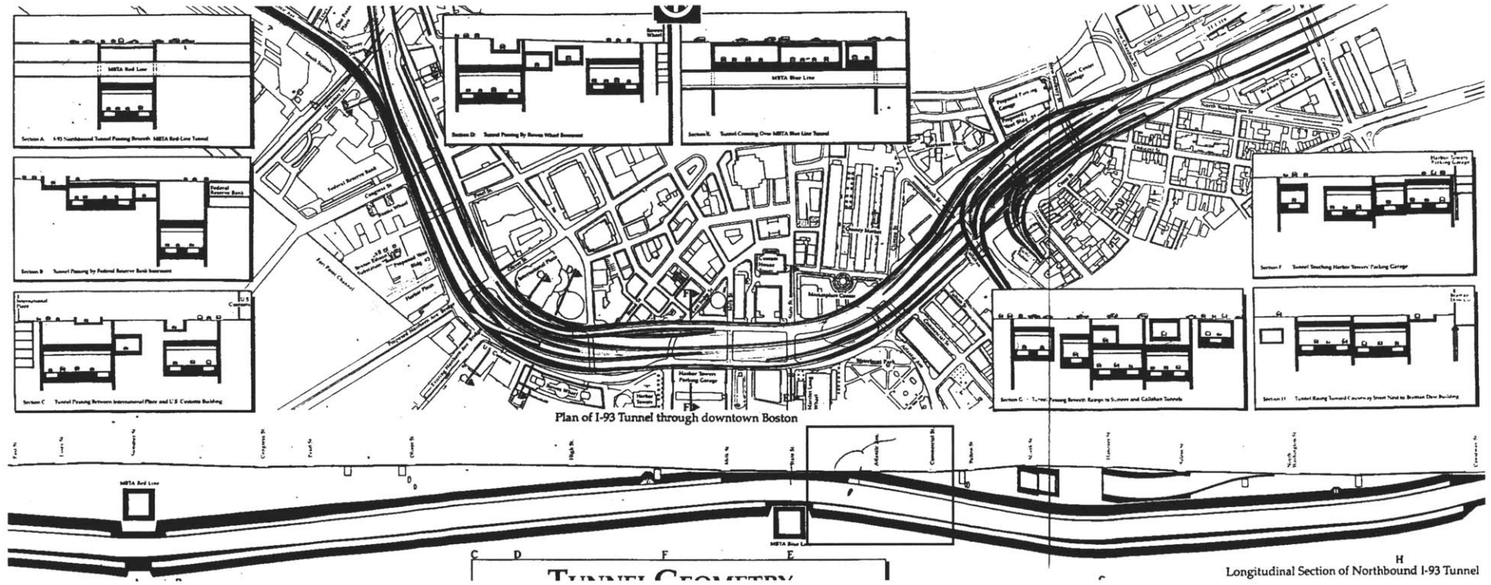
This building skin is altered by lighting, without any physical mechanical movement. I intended to generate space changes by controlling the perception of light. I wanted to design some architecture which changes according to the perception, not by the physical changes.

7.04 Solid information of the site

The hidden central artery tunnel is the Boston's memory. I use this memory as solid information to construct the space of my project. The tunnel is the closest to the ground surface at my project site. Changable surface controls the solid information of the hidden tunnel below.

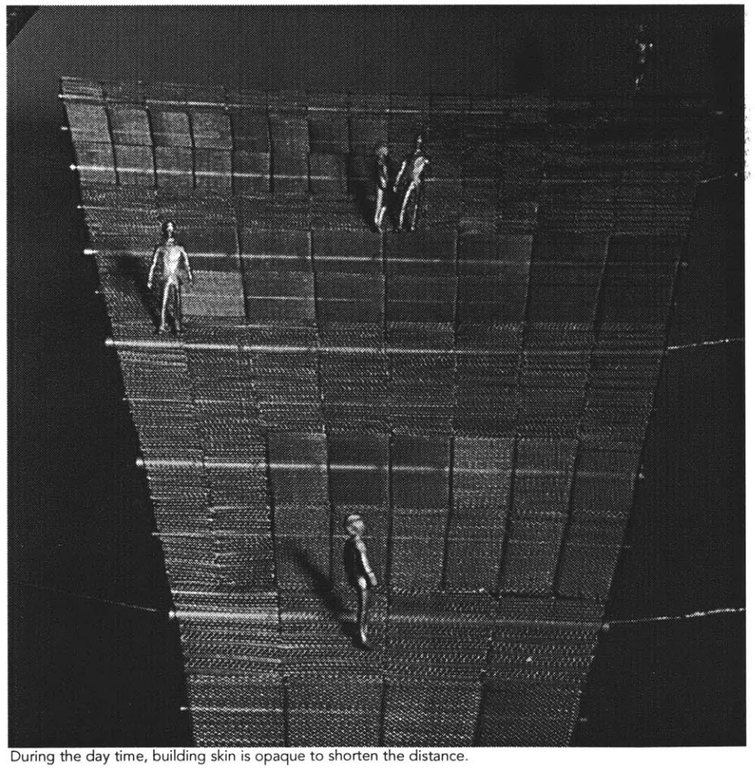
7.05 Design strategy

What we have to design is something in our perception. In the mechanical paradigm, Le Corbusier thought that architecture is a living machine. And many scholars have studied Shape Grammar and form language as a part of mechanical paradigm movement. They think that architecture is form. We should not think architecture as a matter of object.

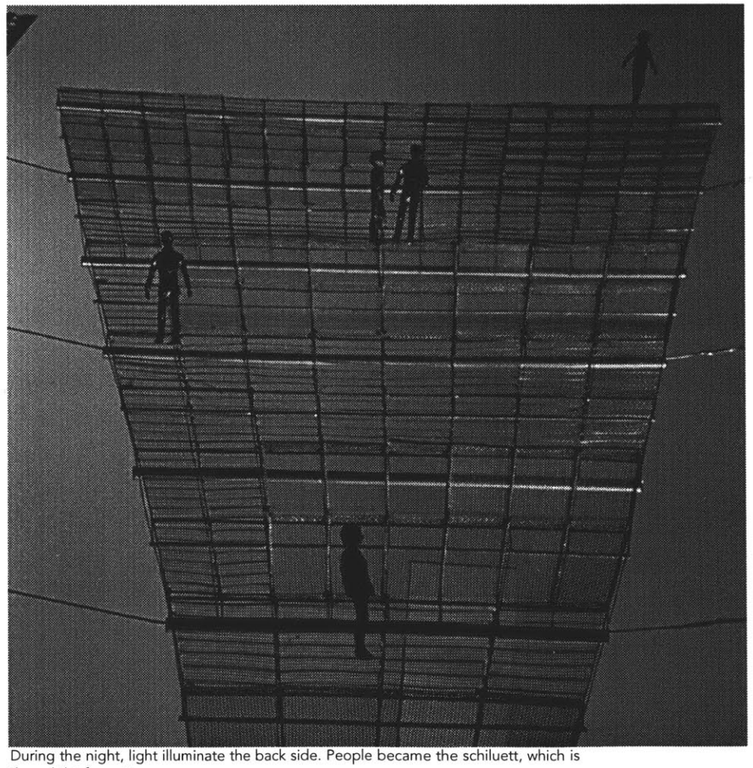


Site location in the Cetral Artery Tunnel Plan.

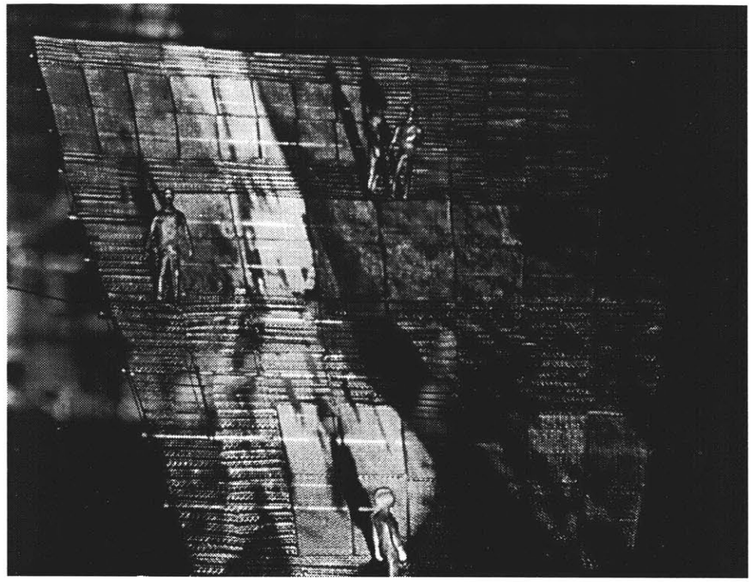
Joint Development parcel-by-parcel Analysis, Central Artery Corrider. Massachusetts Department of Public Works. July 1991.



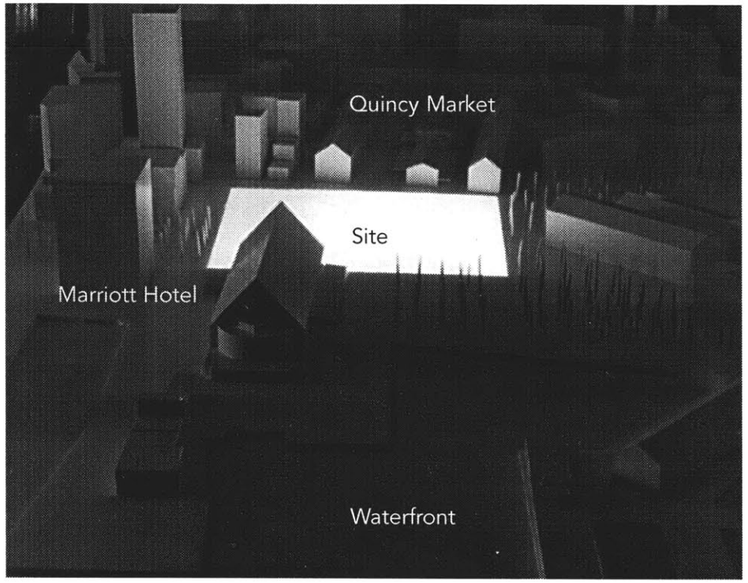
During the day time, building skin is opaque to shorten the distance.



During the night, light illuminate the back side. People became the schiluett, which is the solid information.

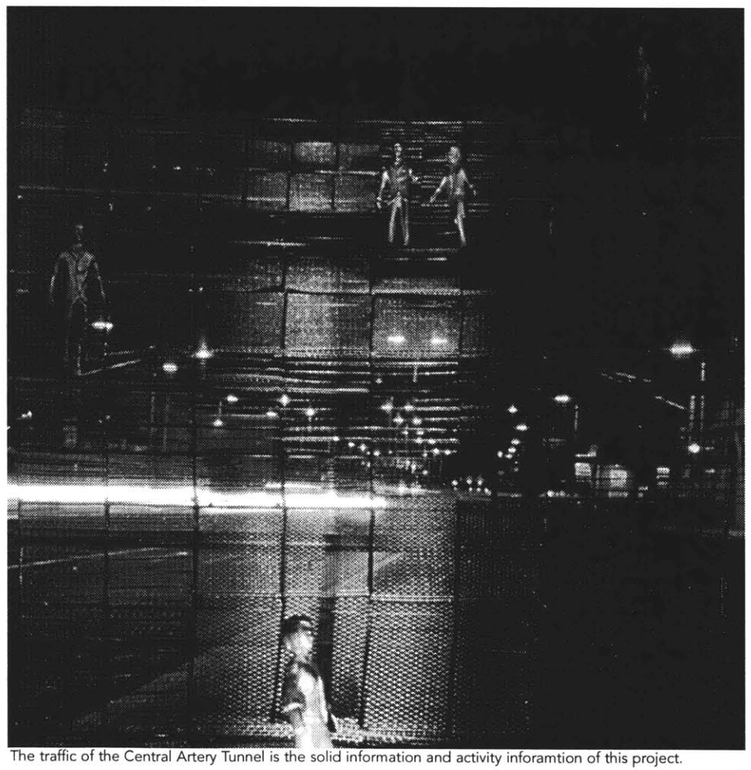


Ther image of the Great Wall of China define the charater of this space



The glass block plaza become an unusual illumination. The traffic light of the Central Artery Tunnel is a major source of the moving lighting sources.

De-materialzation. The image of solid information turns the building pure information.



The traffic of the Central Artery Tunnel is the solid information and activity inforamtion of this project.

7.06 Functions

The corn surface is made of silver color perforated metal screen. Single side projection casts the images on both sides. People can see the brighter side from the darker side. When you are sitting on the surface during the day time, they cannot see the inside parking, central artery, and virtual offices. Therefore, its void information is corn shape. But at night, inside of the corn becomes darker, and parking, virtual office, and central artery get brighter by the traffic light and artificial illumination. People on the corn surface can see the traffic area. Car headlights makes a critical factor to change the void space in this scenario, and the projected images as well. Once the image is projected on the screen, it makes the screen opaque, which changes the void information.

In this project, I tried to make multi-functional architecture language. That is the building skin, the corn surface. In the conventional architecture language, window is window, and floor is floor. In my project, ground floor becomes the circulation stairs, screen for a image projection, window for the virtual offices, and habitable place. All these functions happens at the surface of the corn.

7.07 Contents of the projected images

The content of selection is open to any possibility. Basically everybody can use this projection. There is only a committee to do a minimum screening before the projection.

7.08 Virtual office

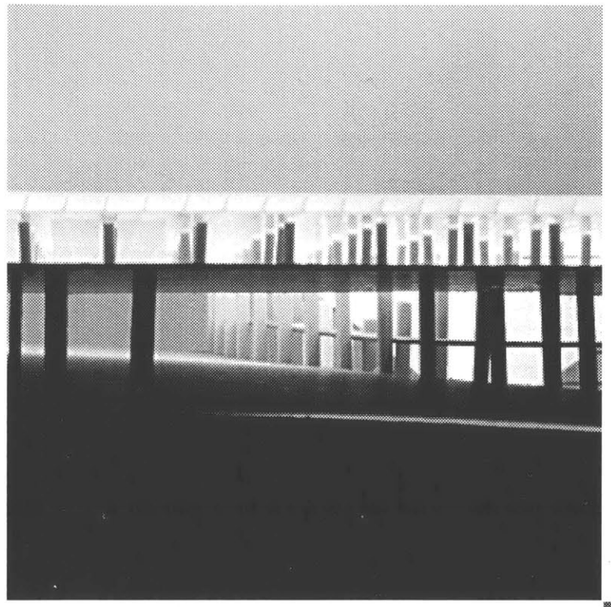
The virtual office is the short-term rental office for the business travelers. Quincy Market is one of the major tourist attraction in Boston.

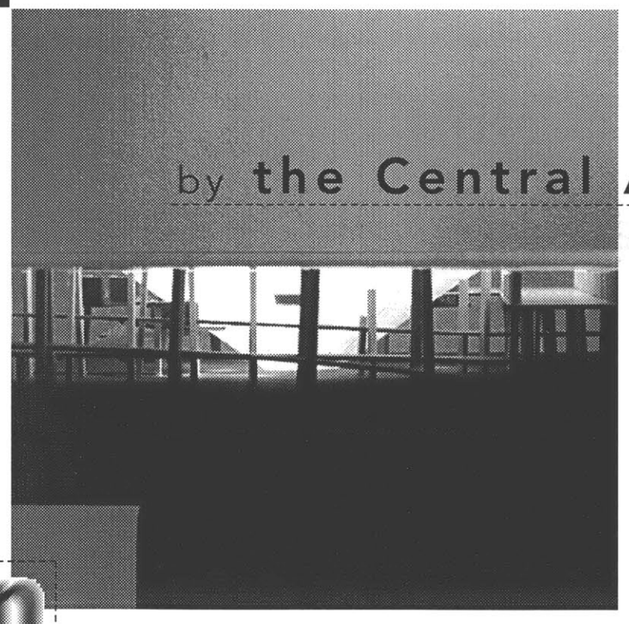
7.09 Structure

The structure of this corn is tension structure of a series of circles. One circle is designed like a bicycle wheel, and smaller one below is hanged from the bigger one above.

7.10 Space transformation by two time curves

There are two major time curves. One is 24 hour curve and the other is 365 day curve. Day and night lighting transform the space. And four seasons transforms the space by changing a big tree inside of corn. During fall, fallen leaves lie on the surface of the corn, which becomes solid information. These two types of curves generate the 365 kinds of combination.

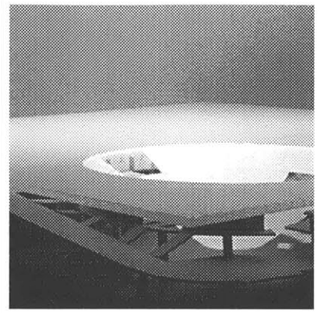


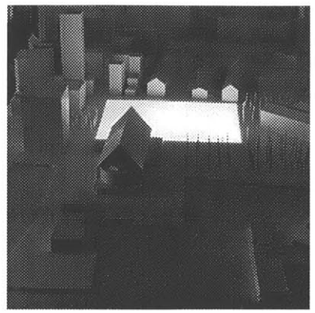


by the Central Artery Tunnel

change your

perception



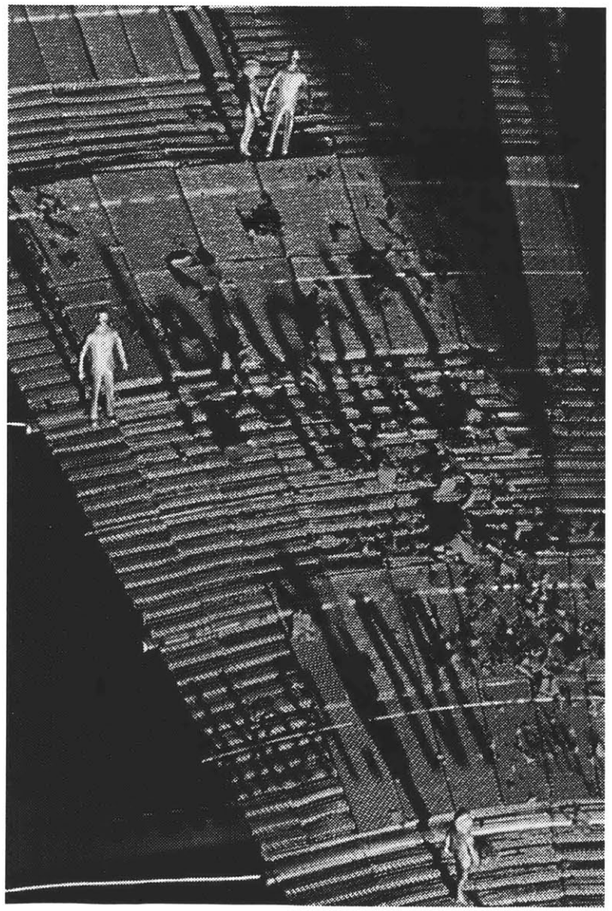


Cyber Plaza

A screen is designed that people can see projected images from both sides of surface. So Basically they can see the images not only from outside of the corn (the parking lots, offices, and artery), but also from its inside.

The projected images are not controlled by certain institutions. Everyone can use this screen to share their information under minimal censorship.

I was thinking of some possibility of usages. If we project other city's view, the meaning of this place would become ambivalent. Is here Boston or China's Great Wall?

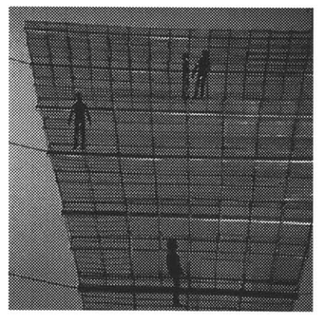


Building Skin Design

Boston's Central Artery highway is under construction. The name of the project is 'Central Artery Tunnel'. All the lifted highway will be sunk into underground tunnel by 2005. My project is located by this tunnel. Its program includes parking lots, virtual office (short term rental office for business travelers) as well as circulation connecting MBTA blue line, parking and Quincy market.
The site is located between the Quincy market, one of Boston's major tourist attraction and water front (Marriott hotel).

This project is about designing the building skin in which changes according to the lighting circumstances. Many functions are incorporated on this surface such as screen, stairs, and amphitheater. People can only see brighter side from the darker side, and they cannot see from brighter side into darker side. So during the day time, people cannot see the parking and offices from above the corn surface. At night, the people become silhouette illuminated by the traffic light of central artery tunnel below.

virtual office



Infotecture: space as void, solid, & activity Information

site: **between Quincy Market & Waterfront**

'glass block plaza

A

A'

glass block plaza

A–A' Vertical Section

B

MBTA blue line station

-6m horizontal section

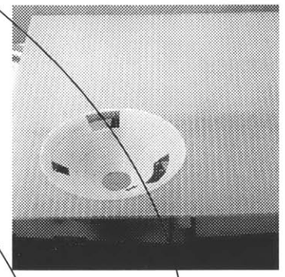
central artery tunnel

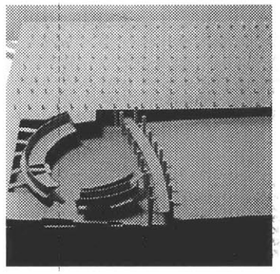
Quincy market

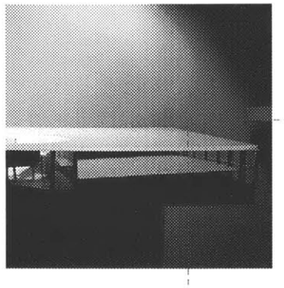
Water front

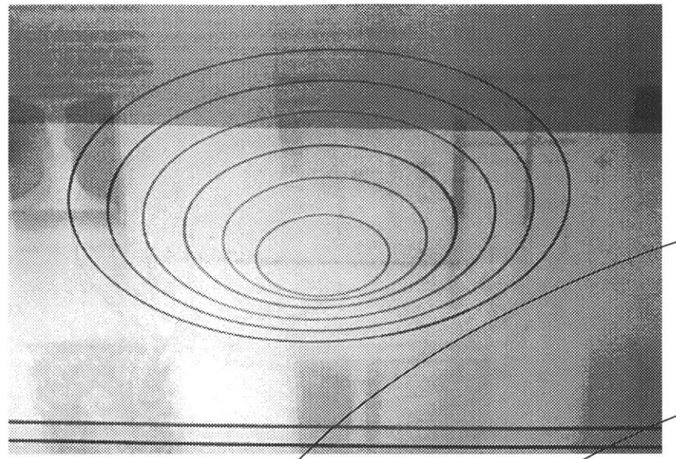
B-B' vertical section

underground parking









3D Space

ellips

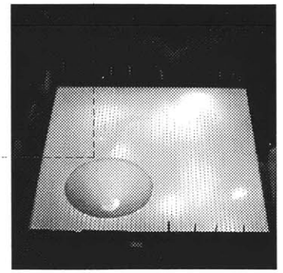
In people's perception of geometry, seeing elliptial perspective of the top of cylinder, makes them recognize the circle shape.

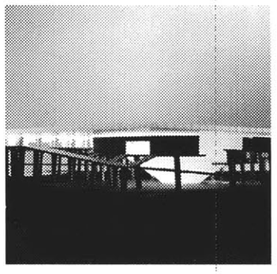
Walking down toward the center of the corn space, people have shrinking circle geometry in plan and enlarging curved geometry line in section. This change of geometry gives a sense of absolute location inside the 3-D corn space. This 2-D geometry map in their brainbecomes a reference to their location.

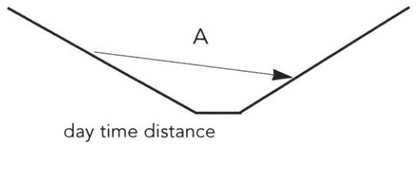
The surface of this corn works as a changing screen system in response to the lighting situation. As you can see in the graphs, the shape of void of this corn changes. And there are images projected on the surface.

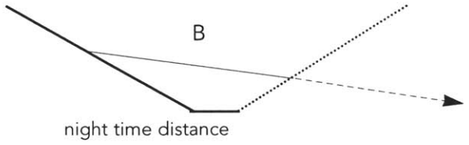
Therefore people have referent void map in their brain, and get solid information from the projected as well as activity information from the traffics and people on the surface and in the offices. All information goes into their brain and 'space' is constructed.

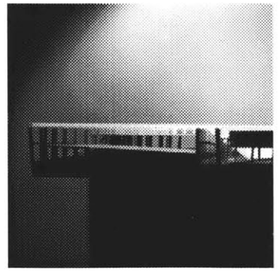
2D visual information

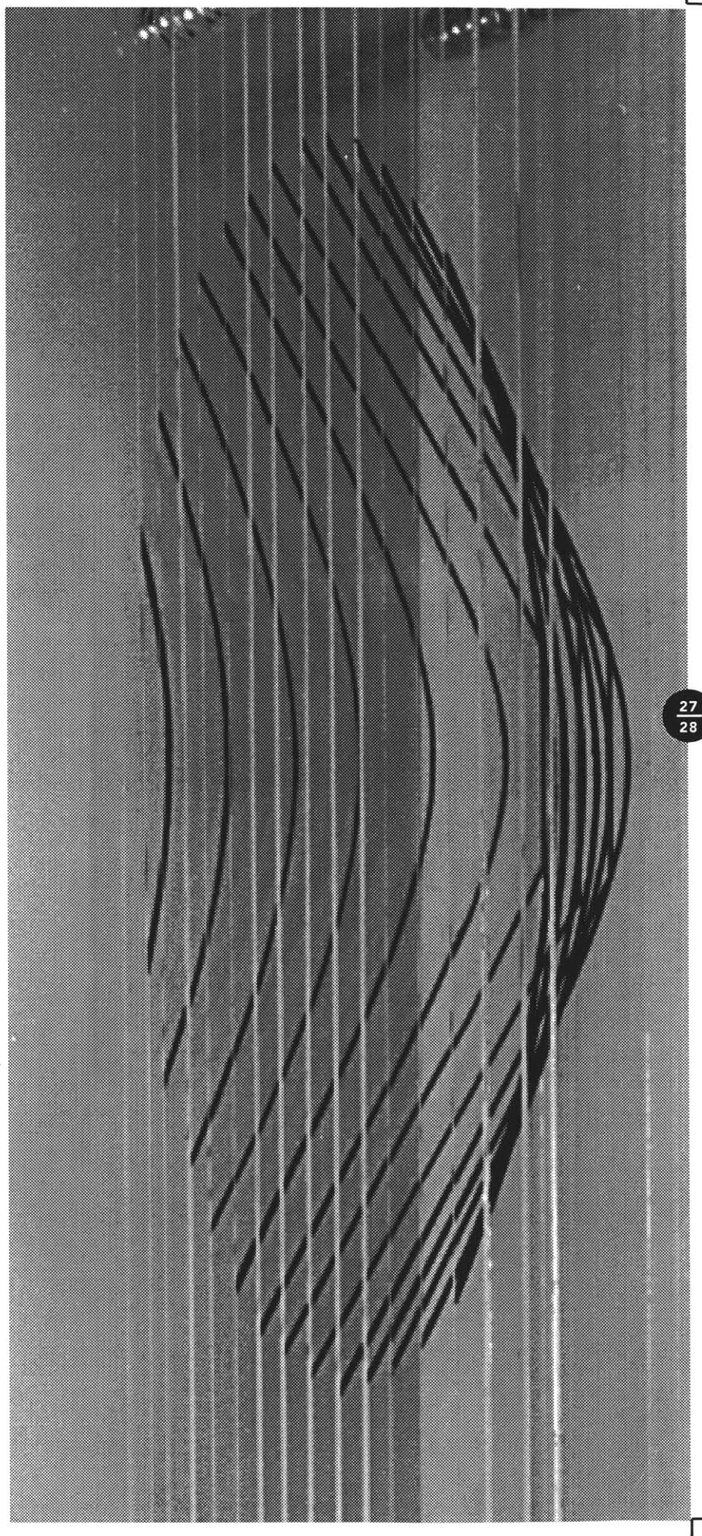












8.00 Conclusion

Designing the architecture is designing the perception in people's mind, which is like the shadow. We cannot see the real 3D object, we only see the shadow, or illusion of it.

Space is a construction work of our brain. It is made of information that we perceive based on our past experiences. We can only fully recognize two dimensional being.

The function of memory enables people to exist at different times. That time factor enables people to see the three dimensional space. We can only collect two dimensional visual information though retina. Yet, like in the case of cartoon, this 2D type of information become 3D notion in our brain through time.

I made three categories of information that we collect from each 2D perspective on our retina at every 1/1000 second. Those are void, solid, and activity information. Void information is emptiness in 3D. It is kind of a container to convey solid and activity information. Void information is the one that can be quantified. In turn, solid and activity information has very personal definition of meaning by their past experiences.

I tried to make a new concept to understand the space in my thesis. 3D space is made of 2D information by the help of memory power and the time factor. This thesis is an experiment to incorporate the ideas that I have discussed above to design the perception. It is an experiment in search of the "real" space.

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