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THE VISIBILITY OF INTERIOR
ELEMENTS OF COMPLEX BUILDINGS

by

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PREFACE

Several problems exist concerning human spatial behavior in large buildings. For instance, confusion can accompany the attempt to identify one's location relative to a desired destination in a large building. Owing to an unclear memory of some areas and the inability to recognize the function of interior spaces, it is not difficult to feel lost or to leave by an unintended exit, even after frequent visits to a building. If many users have similar problems in the same areas of a building, there must be environmental inadequacy in these areas, such as lack of visibility or spatial organization. On the other hand, some buildings may be easily used, understood and memorized by the user after a few visits. This may be simply because they do not have these kinds of environmental inadequacies.

Human image of an environment is the result of a two-way process between user and environment. It plays a significant role in influencing spatial behavior. This image is the memory of the real situation of the environment endowed with personal meanings. In order to systematically identify the environmental character which facilitates human image-forming, this study will begin by establishing a simplified model of the human image-forming process. Significant environmental characteristics will be derived from each phase of the model. Attention will be focused on one environmental characteristic--the visibility of elements of large buildings. This is the visual stimulus offered by the building to help users understand, orient, and use the building. This factor correlates significantly with the perception phase which filters the environmental stimuli in the human image-forming process discussed

in this thesis.

After developing the theoretical foundation of architectural visibility (including its functions, categories, media, elements, and psychological and physiological criteria), the Kansas State University Student Union was selected as the research location for this thesis. The research will partially test a theory concerning the relation of 32 interior spaces in the K-State Union to the environmental or mental images held by a sample of students.

Little literature exists dealing with image-forming at the architectural level. It is hoped that this study will provide an opportunity to help designers better understand the human image-forming process, as well as spatial behavior. In this way, this study will offer part of the information on how to achieve stronger architectural imageability in the design of large buildings through its developed theoretical frame and its research findings.

PART I
THEORETICAL DEVELOPMENT

CHAPTER 1

A MODEL OF THE HUMAN IMAGE-FORMING PROCESS

This chapter presents a simplified model of the human image-forming process. The model has several significant phases, and each phase has unique characteristics and functions. These not only provide a way to explain the especially complicated aspects of the human image-forming process, but also help the author trace out significant environmental characteristics which facilitate image formation in each phase of the process.

Interaction Between Mental Image and Environment

In The Image of the City, Kevin Lynch (1960) pointed out that environmental images are the result of a two-way process between the observer and his environment.

The environment suggests distinctions and relations and the observer--with great adaptability and in the light of his own purposes--selects, organizes and endows with meaning what he sees.

In Cognitive Maps in Perception and Thought, Kaplan (1973) stated in greater detail that man is profoundly influenced by the environment in ways mediated by his sensitivities, his logical structures and his inherited initial condition. It is the interaction of these mechanisms and the initial environment that yield a basis for the processing of subsequent environments. Roger M. Downs and David Stea, in their article "Cognitive Maps and Spatial Behavior: Process and Products", (1970), provides a formal definition of cognitive mapping termed as human image-forming and reflecting process:

Cognitive mapping is a process composed of codes; it stores, recalls, and decodes information about the relative locations and attributes of phenomena in everyday spatial environment.

This raises a series of questions:

- 1) What are the interactions between human sensitivities, logical structure and inherited initial condition? Are they sequentially correlated?
- 2) Why is the human perceiving process relatively free from the direct control of environmental stimuli?
- 3) Why do different persons have different cognitive maps of the same environment? How and why do they code, store, recall and decode environmental stimuli?
- 4) What are the relations between perception, cognition, attitude, and preference which are repeatedly discussed in Downs' and Stea's article? Can we offer an easier way to understand these very complicated dynamic and non-linear processing phenomena?

In the author's opinion, the best way to view these complicated questions is to offer a simplified model of the human image-forming process (see Fig. 1). Each phase in this model has its own functions to fit the operational needs of this process. Interactions between these phases will be discussed later.

A Model of Human's Image-Forming Process

In order to simplify the image-forming phenomenon, a model is provided which is patterned after the computer's manipulating process. From this model, significant environmental characteristics will be traced out in each phase.

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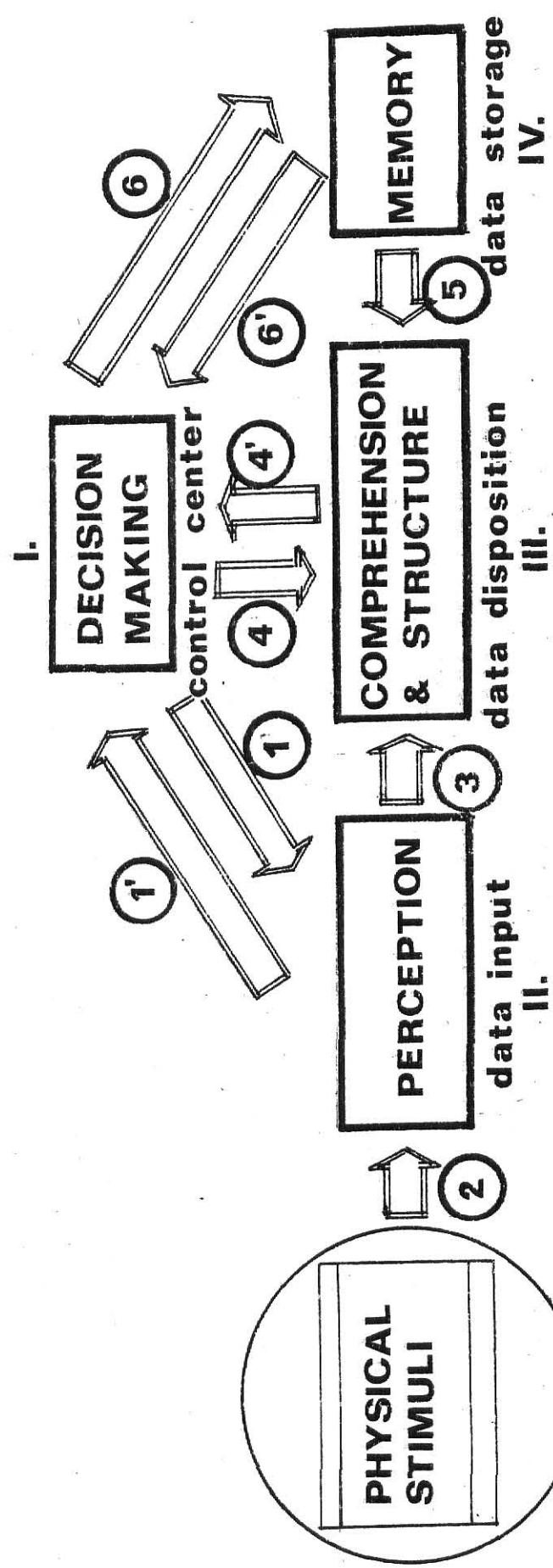


Figure 1
THE MODEL OF MAN'S IMAGE-FORMING PROCESS

Decision Making Phase -- Control Center

The control center in the organization of a computer controls data input, analysis, storage and output in its data processing. Humans also have a control center, called the 'Decision Making Phase' in the image-forming process. In this decision-making phase, humans control image-forming behaviors, such as Perception data input (as (1) shown in Fig. 1), Comprehension and Structure -- data disposition (as (4) shown in Fig. 1), and Memory data storage, (as (6) shown in Fig. 1), all according to the individual's Value System. Two value systems reflect human prioritizing behavior:

1. Short-term Value System: Humans set temporal priorities to control daily behavior, such as routine work, operational requirements, scheduled activities, provisional needs and purposes, etc. This short-term priority fluctuates greatly at different times to fit personal needs.
2. Long-term Value System: This value system reflects human personal attitudes, preferences, long-term objectives or goals of life, etc. It influences human behavior constantly and gradually.

Because of the influence of these two value systems, human perception is relatively free from direct control by environmental stimuli. On the other hand, any attempt to study the coherent tendency of human image-forming in a selected area would need to take into account other factors, such as culture, society, geography, and ethnic differences, etc.

The value system also influences the human data disposition by deciding the suitable logical system to dispose input data (as (4) shown in Fig. 1). In the memory phase, the value system influences the

storing content of the disposed data (as (6) shown in Fig. 1) and picks out the suitable stored data from the memory phase to help the human data disposing process (as (5) shown in Fig. 1).

Perception Phase -- Data Input

Because of different value systems, a person is unable to see all of his world at one time from one place, and is normally required to focus on meaningful and useful information to fit his needs. Perceiving with these filtered perceptual inputs, a great deal of 'data reduction' of the real environment is accomplished. Ittelson (1973) defined the five levels of response to environment as affect, orientation, categorization, systematization and manipulation. These five processes do not function sequentially but continuously interact with each other. In the author's opinion, perception has two significant functions: filter input data relatively free from direct control by environmental stimuli (as (2) shown in Fig. 1), and intuitively judge some kinds of information to fit the needs of the decision-making phase. Here, 'intuitively judge' means one can immediately judge something depending on inherited characteristics or special experience and knowledge without longer, time-consuming considerations. In other words, some kinds of input data in the perception phase 'skip' further processing in the comprehension and structure phases (as (3) shown in Fig. 1) and 'directly transport' to the decision making phase after intuitive judgment. This capacity might be termed the 'shortcut' of data analysis (as (1') shown in Fig. 1). In terms of behavior, this intuitive judgment affects some kinds of orientation, affect and understanding.

Comprehension and Structure Phase -- Data Disposition

The human logical system of data disposition, unlike the simpler arithmetic-logical unit in the computer, has tremendous variety in dealing with its functional content. Efficiency depends on personal intelligence, value systems, background of knowledge and experience, etc. Moreover, this logical system itself is a learning process which has ceaseless growth, feedback and integration of new knowledge and experience. There are five functions in this phase as shown below:

1. Interpretation: To change original input data into personally comprehensible data--to explain, code and endow with personal meanings. In most situations, interpretation is the first step in the data disposition process.
2. Analysis: To find out the elements, the parts, the components, the categories, the causes or the interactions that data are composed of by the judgment of a personal logical system, e.g., the user tries to find the components of an environmental hierarchical organization, such as the categories of areas or rooms in a large building.
3. Prediction: To judge the situation in advance by finding out the meaningful clues, hints or instructions and associating them with correlated experience and knowledge. For example, in a symmetrical building, we can predict the circulation pattern of one side if we know the other side (as shown in Fig. 2). Also, if there is a clear alphanumeric ordering system to arrange different rooms in a building, we can predict the location of each room by understanding its order system. For instance, room C312 in Fig. 3 means the room is located in C wing on the third floor, the 12th room.

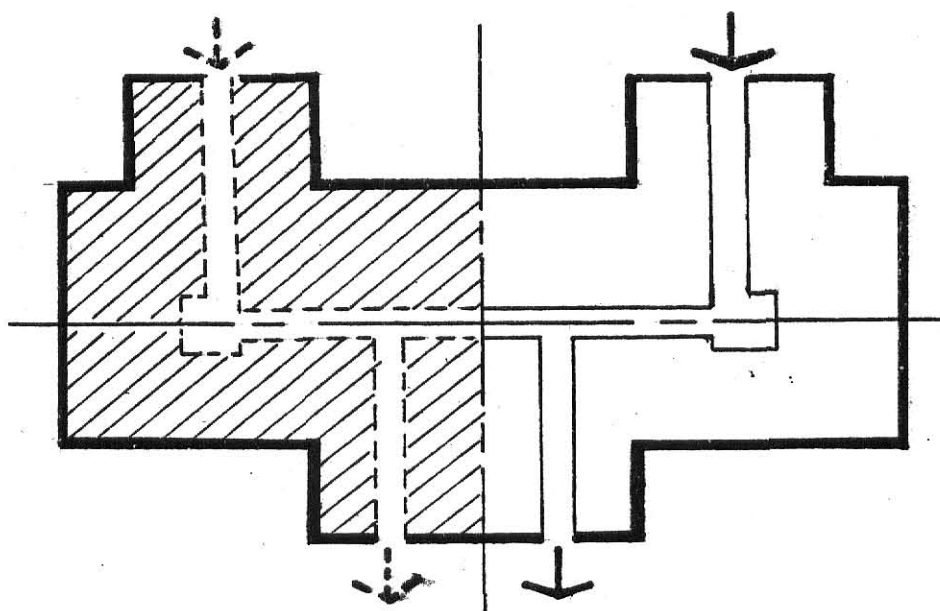


Figure 2
THE SYMMETRICAL BUILDING

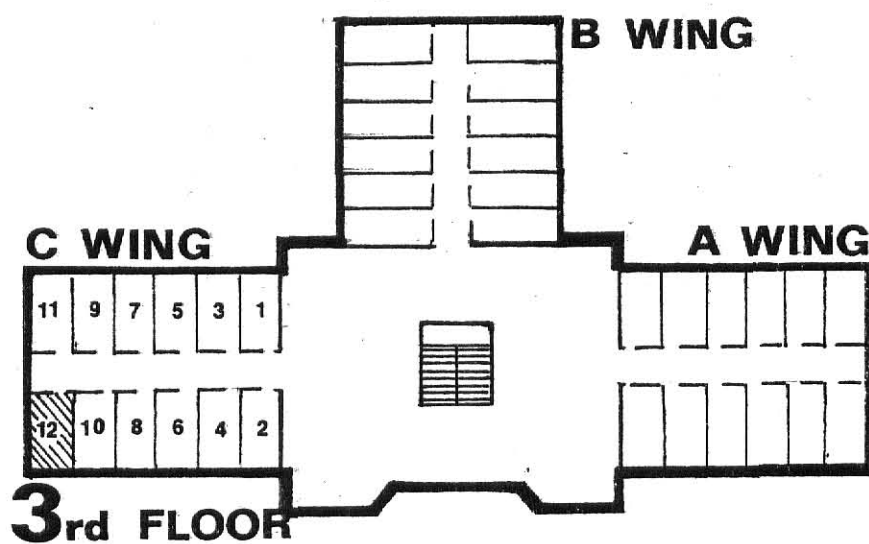


Figure 3
THE ALPHA-NUMERIC SYSTEM OF A DORMITORY

4. Structure: To arrange, group, associate or organize relatively smaller units, elements, components or parts into a larger entirety by personal structural logical systems. There are five structural logical systems usually applied in the architectural field which also help the user structure his environmental stimuli (if he has learned them). The five structural logical systems are as follows:
- a. Operational Processing System: In this system, there are linear connections among the smaller units to achieve operational purposes. For example, in the cafeteria, the user must follow an ordered sequence to finish his meal, such as getting the food, paying the money and finding a place to eat, etc. Each small unit in the system must be suitably arranged to meet the operational needs.
 - b. Alphanumeric Ordering System: Like the way each word is arranged in the dictionary, this order system offers an effective way to systematically arrange different groups or smaller units which may not have other connections, e.g., the room number system in a large building (see Fig. 3) or the shelf-list system of books in the library.
 - c. Functional Grouping System: In most situations, this system deals with the grouping of spaces or rooms which have the same or similar functions. These together become a larger unit. It not only offers a better chance to help the users' association, but is also critically necessary in some situations, such as on the recreation level in the K-State Union. This would avoid separately noisy interruption to other spaces.
 - d. Hierarchical Organization System: This system offers an

'organization tree' which has clear hierarchical ranks and exclusive categories to arrange different spatial units from the lowest rank to the highest one. Along the organization tree, the smallest spatial unit can also be traced out from the highest rank, e.g., on the entire campus, we can trace out different colleges, departments, offices, classes and different studios, classrooms and laboratories. This system assists the user in forming the entire image of the environment, and also facilitates use of the environment. It may include administrative organization.

- e. Circulative Organization System: This is the way for humans to structure environmental stimuli according to experience in the environment. It is the most natural means the human employs in environmental learning. One accumulates lots of daily spatial experience and memory and endows it with personal meanings. Some of these meanings may not have obvious connections to the individual. Some environmental characteristics help the human structure daily spatial experience and memory in this system. The five elements identified by Kevin Lynch which offer a good illustration of the important roles some environmental elements play in influencing human image-forming in this system. If humans try to build a more complete image in the environment, he must impose the other structural systems on this system.

- 5. Transport Disposed Data: After finishing the necessary data disposition processes, such as interpretation, analysis, prediction or structure, the disposed data will be transported to the decision-making phase (as (4') shown in Fig. 1), in which humans

make further decisions according to the disposed data.

In this data disposition phase, there are two different sources of input data: 1) environmental stimuli filtered through the perception phase (as (3) shown in Fig. 1) and 2) stored data recalled from the memory phase (as (5) shown in Fig. 1). Some recalled memory needs further disposition to fit personal needs. For instance, in the human map drawing process, recalled data always needs further judgment and organization to achieve more complete representation. This may include several feedback loops to revise the errors encountered.

Memory Phase -- Data Storage

According to the influence of the decision-making phase, some of the disposed data will be stored in the memory phase. There are two significant dimensions of memory dealing with environmental stimuli:

1. Fact: Its purpose is to store the disposed real environmental stimuli which are coded and decoded by personal meanings when they are stored or called out in memory phase. There are two different types of facts to store:
 - a. Static fact: e.g., the image of the facade of a building, or the graph, size and color of a circulation sign. This kind of memory might be considered independently stored data if the individual does not offer it the correlated meaning with the other data.
 - b. Dynamic Fact: e.g., the image of a route between two places in a large building. The content of this fact may associate with other environmental stimuli which are different at different locations while the individual is traversing a route from point

A to B.

2. Logical System: In most situations, this memory deals with the learning process of knowledge and experience the individual obtains from his daily spatial behavior and study. It may help him to dispose the correlated input data in the future.

Two Characteristics of Human Memory

Distortion

Because of the different meanings an individual gives to objects and the limited content of human memory (which always reduces, ignores, or forgets the parts of the environment not influencing or relating to his use of it), the human environmental image always has some degrees of distortion, as compared to the real situation.

Retention

Because of the limited retention of human memory, there are two kinds of memory (Ittelson, 1970). Ittelson said the function of short-term memory in the processing of visual information is to immediately suggest structure and continuity over time, so that it can be immediately called out by the decision-making phase (as (6') shown in Fig. 1). On the other hand, since the long-term changes over time affect the ways perceptual information is processed, long-term memory might be termed "Symbolic" and short-term "Photographic."

Long-term memory also has two functions in the human image-forming process: 1) Follow the control center's instruction (as (6) shown in Fig. 1) to offer the significant logical systems or facts to help human data disposition behavior (as (5) shown in Fig. 1); and 2) provides necessary information recalled by the control center to the data

disposition phase (as (5) shown in Fig. 1) for further judgment. Therefore, the human cognitive map can more faithfully represent the image, especially in some complicated situations.

The Non-Stop Change in Man's Image-Forming Process

Because the human image-forming process is part of the learning process which changes endlessly during life, each phase in the model of the human image-forming process also automatically and connectively changes at any given time. After learning some significant knowledge, the individual may change his value system, and improve both his data perceiving and data disposing capacity, as well as accrete, diminish or reorganize his data storage (Down & Stea, 1970).

Environmental Characteristics Related to the Image-Forming Process

This section identifies four environmental characteristics traced out from the perception, comprehension and structure, and memory phases in the model of the image-forming process (as shown in Fig. 4). A brief statement of each environmental characteristic is provided. Correlations among them are simply illustrative.

Visibility

This is the environmental characteristic which facilitates human image-forming in the perception phase. It offers visual stimuli to assist and influence human spatial behavior. Visibility encourages orientation, immediate understanding, and prompts use through visual indication and inducement. This study will focus on this environmental characteristic at the scale of large buildings. It will be discussed in

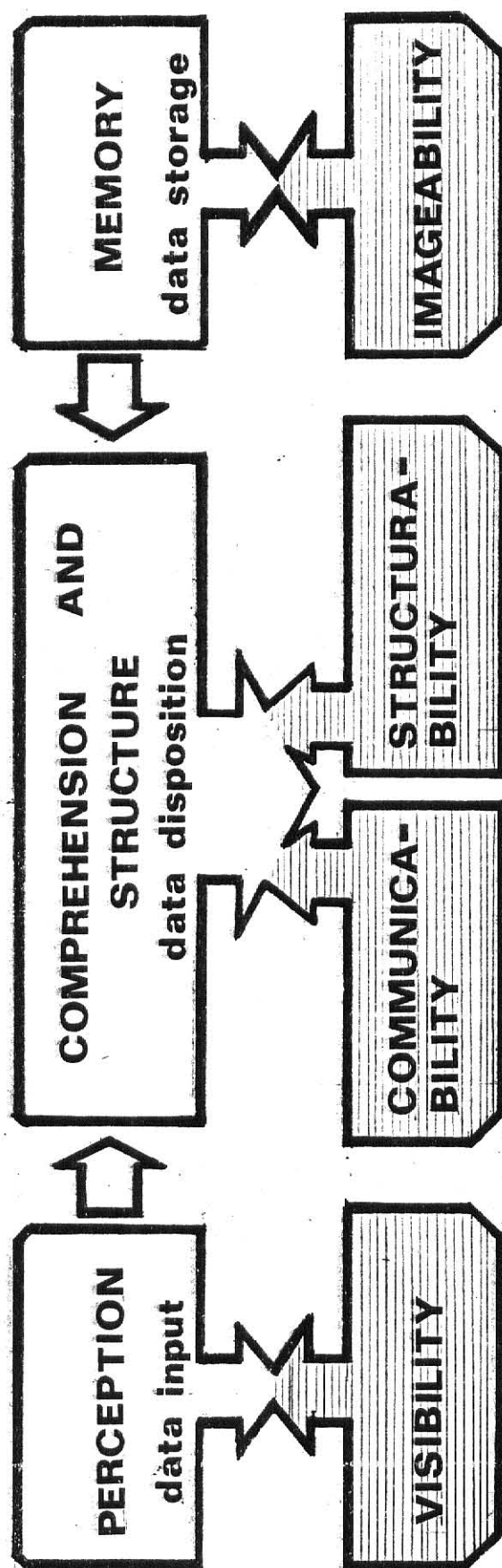


Figure 4
THE ENVIRONMENTAL CHARACTERISTICS TRACED OUT FROM THE THREE PHASES OF MAN'S IMAGE-FORMING PROCESS

more detail later.

Communicability

This is the environmental characteristic which facilitates human image-forming in the comprehension phase. In other words, it assists the individual in communicating between himself and his environment. The two parts of this communication will be separately discussed. Can any effort designed to achieve the design purpose of the environment be understood by the user through his three functions of data disposition -- interpretation, analysis and prediction? Can the environment change its unsuitable post-construction situation to fit the user's needs so the user can understand and use the environment better?

Structurability

This is the environmental characteristic which facilitate's human image-forming in the structure phase. If an environment offers some structured logical system, such as operational processing, alphanumeric, functional grouping, hierarchical organization or circulative organization systems, this environment should have better structurability.

Imageability

This is the environmental characteristic which facilitates human image-forming in the memory phase. In other words, it indicates the degree of human image reflectability of the environment. The human capacity for intuitive understanding, comprehension and association significantly correlates with memory. Visibility, communicability, and

structurability may also have some correlation with imageability. An example is provided to illustrate the correlation between these three environmental characteristics and imageability. If we consider imageability as the memory of a spatial language, visibility might mean the key words or sentences to present indispensable messages. Communicability might mean the grammatical and logical rule necessary to control and organize the message into an understandable narration. Structurability might mean the associative logical system to structure the narrations into an entire idea, concept or paragraph or the total story (or fact) of the language. From the example, if these characteristics can be significantly correlated, this spatial language should offer the best chance for memorization (as shown in Fig. 5).

Non-environmental factors also influence the imageability of an environment. For example, if an environment's services or functions can not meet most users needs, users might get a negative image of this environment. In some situations, the "public need" may be critically influenced by some social or cultural factors.

Because this study focuses on architectural visibility, this thesis will determine if there is significant correlation between visibility and the imageability of the environment.

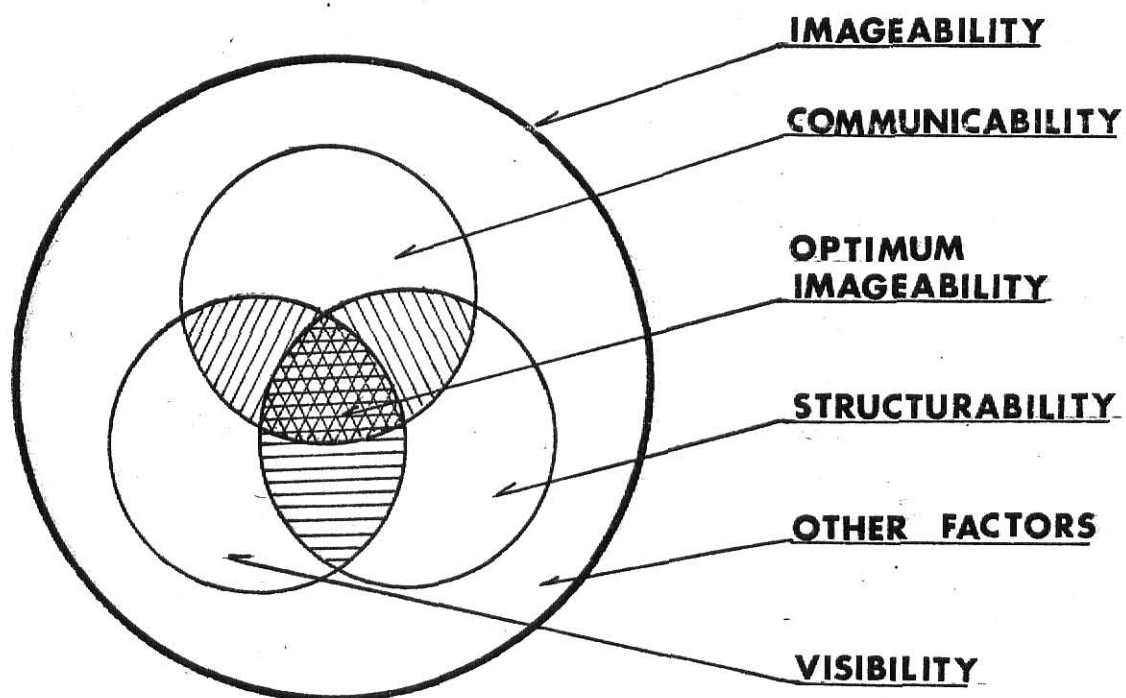


Figure 5 THE COMPONENTS OF IMAGEABILITY

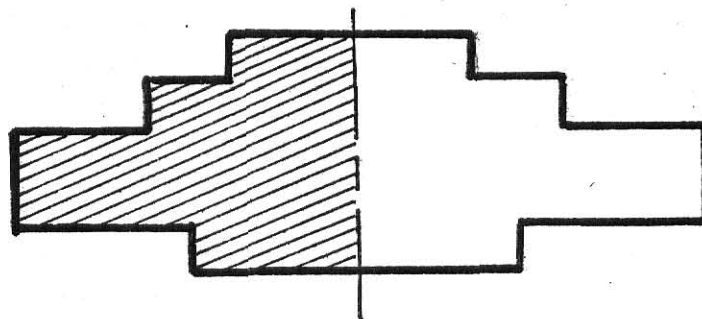


Figure 6a HALF-DIVIDED SYMMETRY IN A BUILDING

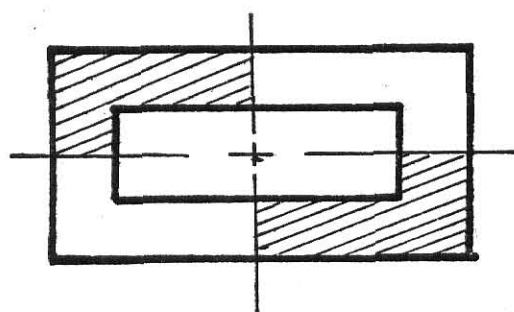


Figure 6b QUARTER-DIVIDED SYMMETRY IN A BUILDING

CHAPTER 2

THE VISIBILITY OF LARGE BUILDINGS:
A SPATIAL LANGUAGE FOR HUMAN VISUAL PERCEPTION IN ARCHITECTURE

This chapter focuses attention on visibility in large buildings. The theoretical framework incorporating the definition, functions, categories, media, elements, and criteria of visibility is provided. The large building has a unique three dimensional scale dealing with man's spatial behavior in such areas as orientation. It differs from other environmental scales such as houses, towns, or cities. For instance, feeling lost in a large building may be quite different from feeling lost in a city, not only because of the obvious imbalance of environmental scales, but also because the individual must judge another factor, his vertical location, in the large building. Therefore, the visibility of large buildings also has its unique character.

Architectural visibility may mean the visual ease with which human spatial behavior can be effectively guided or influenced in a large building. The definition of "Architectural Visibility" is shown below:

The visual stimuli dealing with the internal or external building environment that are offered to help the user understand, orient, and encourage use of the building.

Three Functions of Architectural Visibility

There are three functions of architectural visibility derived from the above definition.

Understanding The Building

The visual stimuli expose the physical relations and characteristics of the building and its inner spaces. This helps the user understand the building. Unlike the "comprehension phase" in which the individual manages his filtered data through cautionary data disposing processes, this understanding involves human intuitive response to environmental visual stimuli without the conscious use of reasoning. The environmental scope of this intuitive understanding deals with ordinary physical characteristics, such as size, shape, function and location of an inner space in a large building.

Orientation and Direction Finding

Architectural visibility offers visual messages, hints, and indications to the user that aids in the understanding of "denotative" or "connotative" instructions (as per Kilpatrick's (1954) concept of the process of perceptual learning) to get to his destination or to avoid feeling lost.

Promote The Use Of The Building

Architectural visibility offers the visual inducement which directly or indirectly shows some activity taking place. It directly encourages or reminds the user to participate. For example, if the food serving area of a cafeteria can be seen through the windows of a building's facade, it may provide direct visual inducement (or visual access) to stimulate the passing pedestrian's appetite by displaying food openly.

Two Categories of Architectural Visibility

Because the visual stimuli a building offer may directly or indirectly present the buildings intentions, there are two different kinds of visibility as discussed below.

Direct Visibility

The content of visual stimuli directly shows internal or external parts of a building to express function, location, organization or the visual inducement of these parts. It offers some views of the "world outside" which may significantly help the user to get out of the building.

Two "Conditions" of Direct Visibility

Unobstructed and unglazed openings provide the best conditions of visibility, for they directly reveal the real situation without any visual interruption or blockage.

See through by transparent material.

In order to meet the requirements of air conditioning or other situations, use of transparent materials (like glass) to offer direct visual access is very common. But the color, degree of transparency and reflection from transparent materials may cause serious visual interruption.

Indirect Visibility

This occurs when the content of architectural visual stimuli indirectly expresses, reflects, simulates, or indicates the real situation of part or the whole of a building.

Eight "Media" of Indirect Visibility

Circulation Sign

The problems of direction-finding in a complex building (especially if it cannot offer enough direct visibility in some significant places) occasionally hinders the user in his way-finding behavior. The most effective way to solve the problems may be to offer an efficient circulation sign system. This is also one of the most important orientation cues for the new user. Three crucial factors must be considered in this system. a) The "location" of each sign should be placed at the choice points of a route, or placed perpendicular to the path of movement; otherwise the sign will be frequently ignored. b) The "Information" displayed on each sign should have legible "generic search words," appropriate "instructive symbols" to indicate direction, and "anticipated phrases" to allow the user to anticipate his next choice point and to recognize it on arrival (Corlett, Manenica & Bishop, 1972). c) The "Continuity" of this sign system must be maintained at each succeeding point until the final choice point is reached.

Identification Sign

This is the media designed to help the user identify the defined spatial unit. It is always placed near the entrance of the spatial unit. There are three kinds of information this sign system may offer: a) specified name (e.g., the Sunflower Room and Catskeller in the K-State Union); this would help the user ascertain if the room inside is his destination, b) functional association (e.g., the Bookstore and the Recreation Area in the K-State Union); the user can understand the function of the inner area from its name, c) Alphanumeric System (e.g., Rooms 204-209 in the K-State Union); in this system, the user cannot

only identify his destination, but may also predict its location by learning some clearly logical arrangement imposed by the system (see Fig. 4). In establishing this sign system, we must consider its legibility, its placed attitude and position, and the direction it should face.

Mirrors

This medium is rarely used in buildings to provide increased visibility; however, its advantages are apparent. Setting a wall mirror in the stairway of a subway station to reflect the situation of the platform may be crucial for a passenger to check if the train is coming.

Form Differentiation

This medium uses symbolic external forms to reflect or indicate the internal functions of different spatial units. It is especially useful in situations which do not allow direct visibility. An example of this would be the form of the Little Theater in the K-State Union. It offers the distinctive curve shown from both the external facade and the internal corridor of the Union. To facilitate user association of the internal functions of a space from its external form, this external form must offer some symbolic meaning to the public.

Other Symbols

A sculpture in a large building may play a role similar to that of a land mark in a city. Fresco painting, other decorations, or different colors and textures may offer significant visual distinctions to help the user in identifying spatial units or in orienting himself. For example, the conference room and study area on the second floor of the K-State Union can be easily distinguished by its unique carpet,

wallpaper and doors.

Bulletin Board

To notify the user that certain activities will take place in certain places and on certain dates and times, this medium could play an important role in providing useful information. It should be located in a position frequently passed by most users of the building and should be legible to attract optimum attention.

Introductory Material

This deals with the model, floor plan, space indicator, or other introductory material which introduces and simulates the real situation of the building to the user. This medium not only introduces each smaller part of the building, but may also offer a learning opportunity dealing with the building's hierarchical and circulative organization systems, as well as its entire service and use program. Thus, the user may understand the entire image of the building more easily. To provide chances for better understanding, this material should be placed in the position where the user has easy access to it.

Inquiry Source

This medium provides individualized oral information about a building to fit specific users' needs. In most cases, it is located at or near the main entrance of the building.

Visual Elements of a Large Building

Because of the unique environmental scale of the large building and its three-dimensional-orientation, nine elements are presented which are significant in architectural visibility. It is not necessary that all nine be included in a large building.

Form

In architecture, form is the external shape of a spatial unit and shows the size and configuration of this unit. The form of the building is the largest and most important dimension in the hierarchical organization of a large building. It may reveal parts of internal characteristics, organizations and circulation patterns. These visual hints may help users understand and orient themselves to the building. It may reveal interrelations with other visual elements and show some visual inducements of inner areas or spaces to help users form a complete image of the building from the outside. If the building has a main facade which includes the building's main entrance, then this facade should be a crucial part of the building's form. The forms of the other spatial units are relatively less important and may have the same or similar functions as the rest of the building's form.

Entrance/Exit

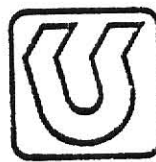
The entrance and the exit are strategic spots in a spatial unit. Through these the user enters and leaves. In most situations, they are combined. However, we can still find some spatial units that have separate entrances and exits, e.g., the Stateroom Cafeteria and the Forum Hall in the K-State Union (see Fig. 7). The entrance hall of the building is the most important entrance/exit in the hierarchical organization of the building. It is the main entrance and the transitive area between the external and the internal spaces of the building. Just as the introduction of an article or the preface of a book, this entrance hall may offer some summarized information of the building to the user, such as the aforesaid introductory material and

ILLEGIBLE DOCUMENT

**THE FOLLOWING
DOCUMENT(S) IS OF
POOR LEGIBILITY IN
THE ORIGINAL**

**THIS IS THE BEST
COPY AVAILABLE**

32 INTERIOR SPACES



**k-state
union**

"host to kansas state university"

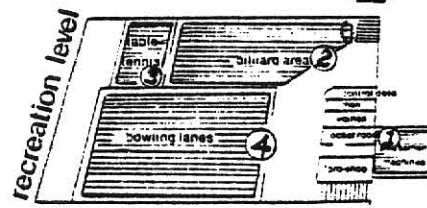
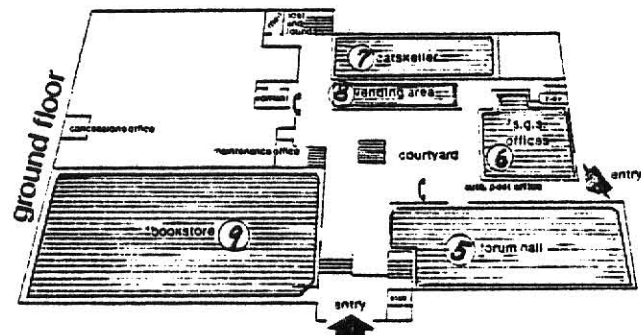
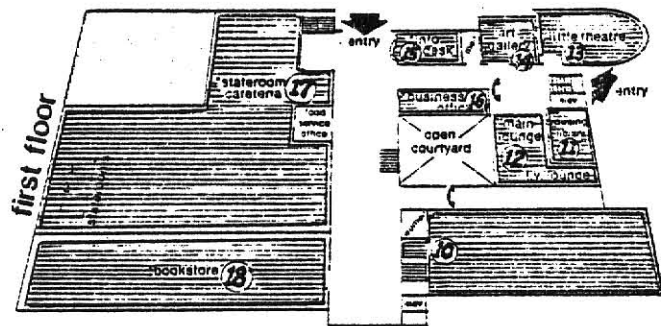
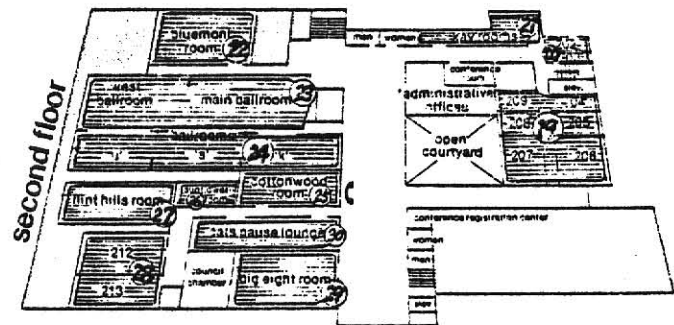
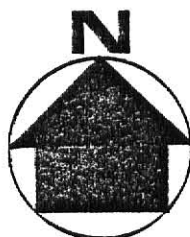


Figure 7



the information counter. It is also important because it may expose a significant part of the building's circulation system to the user, including such things as the locations of the main stairway, the main elevator, the main corridor and the main choice points of the building.

One of the purposes of this thesis is to study the relations between the entrance visibility of 32 interior spaces in the K-State Union and the user's image of them.

Vertical Choice Points

These are the places which connect the different levels in a building, e.g., the entrance of the stairway, the elevator and the ramp. The location and the degree of visibility (from significant directions) of the vertical choice point may influence the user's way-finding behavior. Some visual distinctions should be offered in these places to help users identify their vertical location. Generally, each point should be continuously connected with the other points in a complete vertical point system; otherwise, the situation could cause problems for the user. For instance, what if the stairs of each floor were separated and disconnected from the other stairs?

Horizontal Choice Points

These are the places where two or more corridors meet together on the same level in a building. The more corridors cross, the more the user might be confused. In most cases, a continuous circulation sign system should be positioned at each horizontal choice point of a route to help the user reach his destination or leave through the correct exit. Because most routes include both vertical and horizontal choice

point systems, the continuous connection between these two systems should also be considered.

Vertical Open Space

This is the place which offers vertical direct visibility to some areas between floors or levels in a building, e.g., the courtyard in the K-State Union (see Fig. 7). The user may get strong visual impact from this element, which may directly expose some environmental relations dealing with the character of each floor, the main circulation system or the functions of some interior spaces in the building. To gain better visibility, this element may combine with other significant visual elements in the building, such as the entrance hall, the main vertical point system and the main corridor system (part of which may surround this vertical open space).

Horizontal Open Space

This is an interior space which offers horizontal direct visibility dealing with internal functions visual distinctions or visual access to help users understand the space. It differs from those spaces which use transparent materials to provide direct visibility in that no doors nor walls prevent easy access to the space. It can also be regarded as an interior space if it offers some specified facility. Examples would include the T.V. Lounge and the

vending area in the K-State Union (see Fig. 7). Compared with the vertical open space, this element is less important in helping users understand the entire building because it has fewer connections with the other elements. In most situations, it does encourage users to use its

inner services because it is free of visual blockage and barriers to movement like walls, doors, or rails. If this element is near the vertical choice point, e.g., the open lounge facing the elevator, it may offer some visual distinction to help the user identify his vertical location and get to his destination. If this horizontal open space connects with the form of the building, it may use windows to offer visual access to the "outside world." This may help the user judge his present location and find his way outside.

Area/Floor

This is the relatively large spatial unit in the architectural hierarchical organization which has several functionally independent interior spaces. Four differentiations offer the different ways to define this element: a) Functional Differentiation--as with the aforesaid functional grouping system in architecture, the areas under this differentiation should have their unique functional attributes; by these the user may associate each interior space into an undivided entirety; e.g., the Recreation Area in the K-State Union; b) Locational Differentiation--the area under this differentiation should have its distinctive locational attribute; for example, the user may regard each floor as an area or he may regard the spaces around the courtyard as an area. Sometimes, we can regard the grouping spaces divided by the main corridor as an area. This differentiation is frequently correlated with the functional differentiation to define different areas; c) Configuration Differentiation--the configuration may attempt to divide it into areas; axial symmetry naturally divides a building into halves or quarters (Fig. 6); d) Uniform Differentiation--the area under this

differentiation uses non-alphanumeric symbols (the 5th medium of indirect visibility), such as color and texture, to offer the uniform visual distinction for each interior space, e.g., the conference and study area of the K-State Union can be easily differentiated by its unique carpet and wall paper. From this differentiation, some areas which have been added on to in buildings can also be clearly identified.

Interior Space

This is the relatively smaller spatial unit in an architectural hierarchical organization and may have an independent entrance/exit as well as functions which have undivided operation processes. For example, we can regard each conference room as an interior space, but we cannot regard each room or smaller unit in the Bookstore or the Cafeteria as an interior space because of their non-independent functions and entrance. In most cases, this element is the main spatial unit of users' destinations in a large building. Thirty-two interior spaces of the K-State Union will be studied in this thesis.

Corridor/Path

This is the pedestrian's channel to a destination in a building. In the corridor system of a building, we can define the main corridor by its width, location, frequency of use and connections with the other main visual elements (such as the entrance hall, the main vertical and horizontal choice points and the open space). Corridors that are too long, too narrow and "double loaded" may be inadequate because they may subconsciously arouse tension. The inability to orient direction owing

to lack of visual access may also cause problems. Unnecessary changes in a corridor system pertaining to its length and direction should also be avoided. Offering visual access, an understandable sign system, distinctive corridor termination and other symbolic information may avoid the dilemma of "seemingly endless and undifferentiated corridors."

The Psychological and The Physiological Criteria of Architectural Visibility

In order to check the accuracy of each category, condition, medium and element of architectural visibility, several psychological and physiological criteria are shown below.

Psychological Criteria

Intuitive Comprehensibility

The content of each visual stimulus should be clear to avoid any possible misunderstanding by the user. Also, each visual stimulus should be easily understood by the user within a short time. For example, the content of a circulative sign should be easily understood when users glance at it.

Simplicity

This is important to reduce the user's memory load and focus his attention while responding to the stimulation caused by different visual stimuli.

There are six appraisal criteria of simplicity as shown below:

Indispensability

Does each visual stimulus really help the user understand, orient or enhance the use of the building? Can it be omitted?

Uniformity

The units of the medium systems (such as the circulation sign system and the room number system) and the spatial unit system (such as the interior spaces of an area) might have to have "coherent identifying clues" to let the user know they are in the same system or group. For example, the meeting rooms on the second floor of the K-State Union use the same rugs, wall paper and door style to define a uniform meeting area.

Reducing Unnecessary Changes and Selections

The number of directional changes and the different path lengths in a route, disconnected stairs, and more than three routes crossing at a horizontal point often correlate with the user's disorientation. In the K-State Union, the discontinued stairway systems discourage the user's use of its third floor. This is an example of unnecessary environmental changes.

Providing the See-through-directly-visibility

Because of the human limited storage capacity, the more of a building its user can survey from any one point inside of it, the less the "cognitive demands" imposed by that building. In other words, the better way to reduce the user's memory load and the mistake caused by getting messages through different media (such as the circulation sign system) is to directly expose the real situation to him. This may be one of the "best visual stimuli" to arouse the user's stronger visual impression. For instance, if the user can directly see the locations of

the stairway and the choice points of each floor from the entrance hall of a building, the circulation sign system may be frequently ignored by the user because he can easily find his way through the direct visibility offered by the building.

Emphasizing the "Imageable Priority of Location"

Dealing with the before mentioned circulation organization system, the location of each visual stimulus may also influence the user's spatial behavior and his images of the environment. The more a user passes by a location, the more he gets to see its visual stimuli, and the better chance he has to remember these stimuli. Every building has its own circulation system. The circulation elements of this system are the aforementioned eight architectural elements except the interior space which is often the user's destination in the building. Each circulation element has its own imageable priority decided by the likelihood it being passed. For instance, the main entrance has a better chance to be passed through than any corridor in a building, therefore, it is more likely to be memorized. An ordinary order system of the image priority of the circulation elements is shown as follows (from the first to the last): Facade/Entrance hall/Courtyard/Main Corridor/Main Stairway/Area/Corridor.

Dealing with the interior space, the imageability of location in an interior space may be significantly dependent upon the nearest circulation element to which it is adjacent. For instance, the spaces near the main entrance have better imageability of location than those near the corridors. If the designer tries to achieve better imageability of an interior space in a large building, he should consider whether the location of this interior Space is close to a

circulation element having higher imageable priority. By this the user may more easily pass and see the space so as to reduce his memory load for identifying its location.

Combining the "Main Visual Elements" to Achieve the "Optimum Direct Visibility"

One of the most efficient ways to reduce the user's memory load is to reveal all the important visual stimuli at one time. The combination of main visual elements may achieve this goal. The more they are combined, the better stimuli they offer. For example, in a very visible building, one may see that its courtyard and main stairway are naturally combined together and surrounded by main corridors. Meanwhile, one can see the character, the entrance and the main horizontal choice point of each floor from the courtyard-entrance hall.

Continuity

To validate the messages offered through different conditions and media, continuity means the connections of messages offered at significant positions (such as the vertical and the horizontal choice points) along a defined route. This connection should be in a complete and understandable language to guide the user's way-finding behavior related to the systems of a building's circulation and identification signs, stairway and room number.

Physiological Criteria

The "legibility" of visual stimuli is the main factor needed to meet the user's physiological needs. Some criteria of legibility are shown below:

Direction

Perpendicular to Movement

In most cases, the visual stimuli should be placed perpendicular to the path of movement. As examples of this, the sign system along a route or entrance of each interior space should also be perpendicular to the user's movement to avoid being frequently ignored.

Direction of Vision

Since we may often find it is easier to orient our direction going down from a higher location to a lower location, thus avoiding the visual blocks caused by slabs, walls and rails of a building, the direction of vision may significantly guide human spatial behavior. By avoiding unnecessary visual blocks, the direction of looking down may offer the best legibility in a building.

Distance

The suitable distance of visual stimuli from a significant position also influences the stimuli's legibility for limited human vision owing to visual focusing limitations. If the distance is unchangeable, we should use a suitable size of stimulus. For instance, the lettering of an identification sign or the width of an interior space's entrance could be altered to produce the desired legibility.

Altitude

Unsuitable altitude of visual stimuli may cause the stimuli to be ignored by the user. Generally, the suitable altitude of horizontal visual stimuli should be the average altitude of a man's eyes.

Color & Texture

Using color or texture contrast to achieve legibility is an effective way to arouse users' attention. For example, color contrasts, like red vs. green and yellow vs. blue; or texture contrast, like metal lettering on a wooden board in the design of a circulation sign could combine to increase legibility.

Other Factors

Other factors can significantly reduce or interrupt the legibility of visual stimuli; e.g., unsuitable lighting or glare or the degree of transparency of glass.

Conclusion

Many factors influence the visibility of a large building. Even the interaction between the categories, media, elements and psychological and physiological criteria can be separately studied to understand their weight on influencing the visibility of large buildings.

The following research part of this thesis focuses on the 32 interior spaces of the K-State Union. As an architectural element, the interior space is often the user's destination in a large building. In this research two major research goals are the study of entrance visibility and the location of interior spaces.

PART II
RESEARCH STUDY

THE ENTRANCE VISIBILITY AND THE LOCATIONS OF 32 INTERIOR SPACES IN THE K-STATE UNION

Introduction to the Research

In this section, the research study focuses on the interior spaces of large buildings. Thirty-two interior spaces of the K-State Union were selected as the environmental entities in this research.

Three experimental variables: 1) functional identification, 2) location identification and 3) frequency of use are used as measures of users' images to avoid the unmeasurable dilemma of the unlimited content and variety of human imagery.

Two research methods: 1) a picture identification test and 2) a map drawing test were employed to study the entrance visibility and the subject's image of the interior space. From this study, the chance is provided to test three functions of architectural visibility and the correlations between these three functions and the imageable priority of the location of the interior spaces. Employing the same experimental variables in these two research methods also provides the opportunity to validate subject responses.

Compared with the entire study of architectural visibility (which should include the study of the interactions between visual elements, the visual media and the functions of architectural visibility, this study explores a small part of the whole.

Research Scope

In order to avoid the unmeasurable dilemma of the unlimited content and variety of human image, three experimental variables are selected and described below:

Functional Identification is used to test the subjects' understanding of the functions of each interior space by asking him/her to identify the name of the space.

Location Identification is used to test the user's understanding of the location of each interior space. This is done by asking him/her to judge the vertical and the horizontal location of each. This variable has two sub-variables: 1) vertical location identification and 2) horizontal location identification.

Use Frequency is used to study the subjects' use frequency of each interior space on a daily, weekly, or monthly basis.

The experimental processes needed to test these variables are shown in Appendices A and B.

Research Goals and Hypotheses

Three research goals deal with: 1) the three functions of entrance visibility of each space, 2) the intercorrelation between the three functions of entrance visibility and 3) the imaginable priority of different locations of each interior space.

Three Functions of Entrance Visibility

The research goal here focuses on assessing the entrance visibility of interior space and its influence on subjects' understanding, orientation and use. Hypotheses No. 1 was formulated as follows: If the interior space has better entrance visibility, the subject should identify its functions and location with greater ease and use the space more often.

The Correlations Between These Three Functions

To study the correlations between the three functions of entrance visibility, two research questions emerged.

1) Does the frequency of use significantly correlate with functional identification and location identification? As one of the main factors in building human familiarity with the environment, the frequency of use of an interior space may play the most important role in influencing human image-forming of the space. Hypothesis No. 2 was formulated as follows: If the frequency of use is crucial for human image-forming, then its correlation with functional identification and location identification should be higher than the intercorrelations between the latter two variables.

2) Does the functional understanding of an interior space help the user determine space location? In other words, "Does the functional memory of a space associate highly with location memory?" Hypothesis No. 3 was formulated as follows: If functional identification crucially influences location identification, then they should correlate significantly.

Imageable Priority of Location

As one of the psychological criteria of architectural visibility, the imageable priority of location related to the interior space may play a significant role in influencing the user's image-forming of the interior space showing its entrance or some visible parts of its inner space through certain routes and directions. In the author's opinion, the interior spaces around the main corridors of the K-State Union have a better chance of being passed or seen than those spaces which are not

in the vicinity of the main corridor. In short, they have more imageable locations. Hypothesis No. 4 was formulated as follows: Dealing with the location of each interior space, if the interior spaces are located around the main corridors, the subject should identify more easily their functions and locations and use them more often than the other interior spaces.

There are three groups of interior space which are around the main corridors: 1) the spaces near the main entrances, 2) the spaces near the main choice points, and 3) the rest spaces around the main corridors (see Figures 8 and 9). In the author's opinion, the imageable priority of the three visual elements - the main entrance, the main choice points and the main corridor - should be as follows: main entrance/main choice point/main corridor. Hypothesis No. 5 was formulated as follows: The interior spaces near the main entrance are categorized at the primary level of understanding, orientation and use. The interior spaces near the main choice points are categorized at the secondary level, and the interior spaces for resting around the main corridor will be at the tertiary level of these variables.

To study the imageable priority of vertical locations, the author presumes that the interior spaces on the level vertically closest to the main entrances may be memorized more easily and reached by shorter vertical distance. Since each level has several interior spaces located on it and can receive a mean score for each experimental variable. Hypothesis No. 6 was formulated as follows: If the vertical distance from a level to the main entrance does influence the user's image of interior spaces on this level, the order of the mean scores of the experimental variables in the K-State Union should be first floor/ground

floor/second floor/recreation level/ third floor, ranging from highest to lowest.

Research Methods

Two research methods, 1) a picture identification test and 2) a map drawing test, were used for this study.

Picture Identification Test

This method displays a picture of the entrance to each interior space to which the respondent indicated the space's inner functions, vertical and horizontal locations, and the frequency with which they use it. (The process of this method is shown in Appendix B.) The identification clues offered by each picture may reflect different levels of entrance visibility. The more identification clues the subject gets from the entrance picture of a space, the better entrance visibility this space gets. Since the picture directly expresses the real situation, less memory load is required from the subject and the mean scores of variables measured by this method were expected to be higher than those in the map drawing test. In short, this method offers the chance to study the relation between the entrance visibility of interior spaces and human capacity to identify them.

Map Drawing Test

This method presents the blank floor plan of each floor level to subjects on which they respond to the same experimental variables as the former method by drawing them on the plans. (The process of this method is shown in Appendix A.) Fixed information, such as circulation

patterns, employee areas and the configuration of each floor plan is provided as orientation clues to help the subject draw each interior space and judge the combination of these spaces according to his image of the entire building.

In order to understand the user's image map, different lines (e.g., solid lines and dotted lines) are employed to assess the indications of the user's level of image confirmation. (See Appendix A.)

Compared with the picture identification technique, this method was expected to be more difficult, owing to its lack of direct visual clues and its high dependence on the user's image of the environment. Nevertheless, this may be an effective way to understand the relation between the user's image and the "imageable priority of location" related to interior spaces.

On-spot Observation -- The Preparatory Work

In order to fulfill the statistical data analysis of the formulated hypotheses, this method is indispensable in categorizing the different entrance visibility factors and in understanding the main corridors. The main choice points and the main entrances are used as the indicators of different ways of grouping the 32 interior spaces to fit the needs of each hypothesis.

The category of entrance visibility and the location of each main circulation element are decided through the author's on-spot observation of their different visual characteristics and or their frequency of being passed.

Rating Scale of Experimental Variables

The three experimental variables, 1) functional identification, 2) location identification and 3) frequency of use employed in the two research methods are equally assessed by an 8-point rating scale in this research.

The rating system of each experimental variable is shown below:

Functional Identification

- 8 - the subject identifies correctly and with surity
- 6 - the subject identifies correctly but not with surity
- 4 - the subject identifies incorrectly and not with surity
- 2 - the subject identifies incorrectly and with surity
- 0 - the subject cannot identify completely

Location Identification

This experimental variable has two sub-variables--1) vertical location identification and 2) horizontal location identification--which are equally weighed by the 4-point rating scale shown below:

- 4 - the subject identifies correctly and with surity
- 3 - the subject identifies correctly but not with surity
- 2 - the subject identifies incorrectly and not with surity
- 1 - the subject identifies incorrectly and with surity
- 0 - the subject cannot identify completely.

Frequency of Use

- 8 - the subject uses almost every day
- 6 - the subject uses 2-3 times a week
- 4 - the subject uses 2-3 times a month
- 2 - the subject uses 2-3 times a semester
- 0 - the subject never uses.

Environmental Introduction

The environmental object of this research, the K-State Union, was designed as a center for the social, recreational, educational and cultural activities of the KSU campus community. It opened March 8, 1956 and received its first major addition in 1963. A second addition, which doubled the size, was completed in 1970. The five-level structure, covering 247,000 square feet with a three-story courtyard in the center, was built at a total cost of \$5 million. It is located on the southwest corner of the KSU campus and is near the intersection of two streets--Anderson Avenue and 111th street--in Manhattan, Kansas. (See Fig. 10, the map of the KSU campus; the arrow and circle denote the location of the Union.) Three buildings--Kedzie Hall, Anderson Hall and Seaton Hall--bound the site of the Union. There are two main entrances in this building one directly facing Seaton Hall and the other facing the parking lot to the south near the intersection of the two streets mentioned.

There are two primary reasons the Union was selected as the environmental object of this research: 1) It is a reasonably typical public building with many different interior spaces and elements of architectural visibility including the courtyard--the vertical open

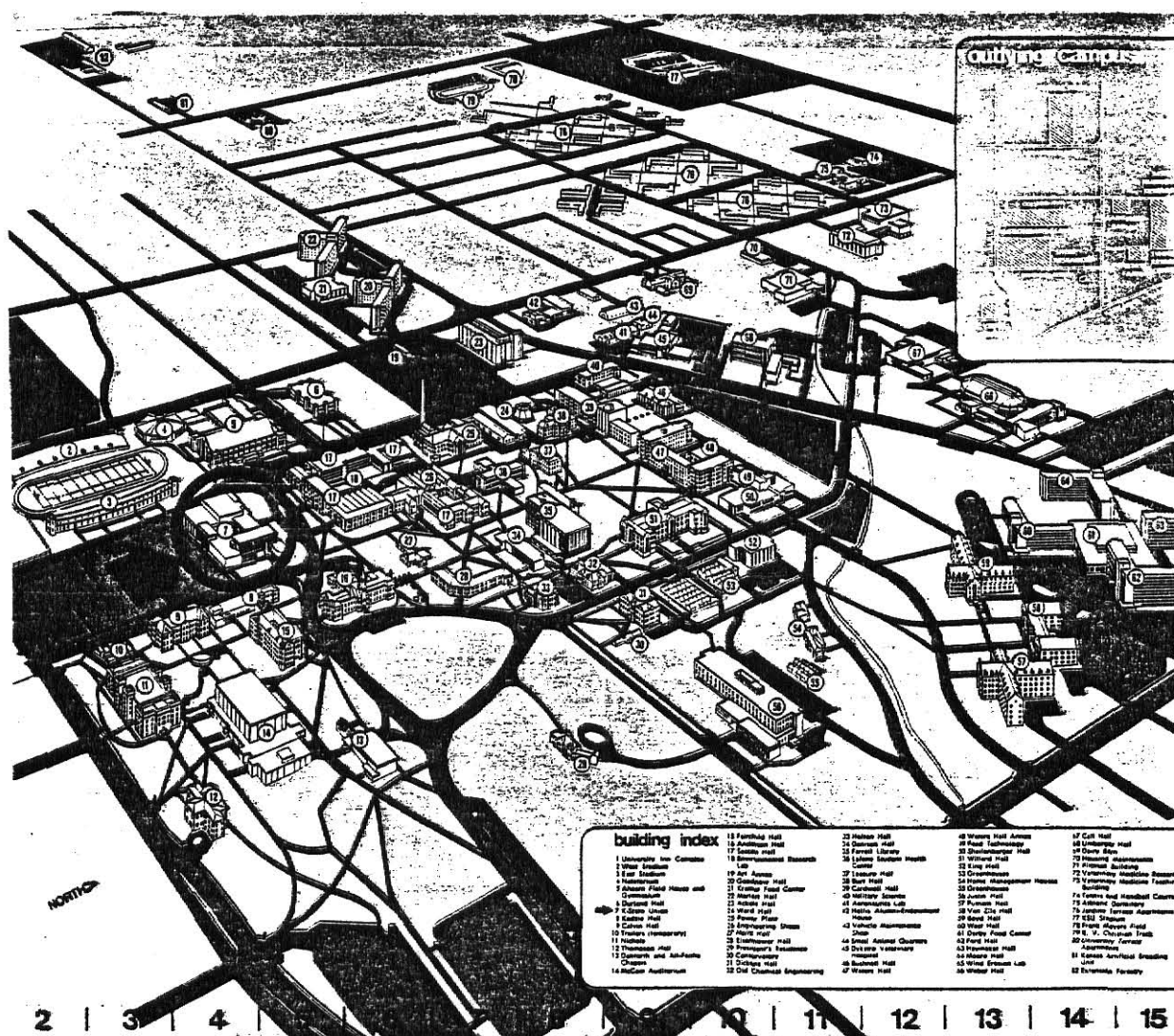


Figure 10 **the map of k.s.u. campus**

○ Denotes the location of the K-State Union

space, (see Fig. 7, The 32 Interior Spaces of the K-State Union); 2) It is the most frequently used building on campus and serves every student and faculty member of KSU; therefore, the randomly selected subjects in this research were easily contacted. As the environmental objects in this research, the 32 interior spaces have their own names, functions, sizes, capacities, levels and locations, as shown in Appendix C.

Analyzing the Findings

The first three parts of this section discuss the statistical outcome of the research hypotheses formulated through the research goals. Other findings of this research are discussed in the fourth part.

The Three Functions of Entrance Visibility

In order to fulfill the first research goal dealing with the three functions of the entrance visibility of interior spaces, two research methods (the picture identification test and on-spot observations) were employed.

Three categories of entrance visibility were found through the author's on-spot observation. 1) The Open Space: The space in this category doesn't have a wall, door or windows as visual blocks and movement barriers to keep users from seeing or walking directly to their destination. There are thirteen spaces in this category which are assumed to be at the primary level of entrance visibility. (See Table 1.) Each space in this category is marked as (G1). 2) The See-through-via-glass-entrance: The spaces use transparent materials such as glass doors or sliding windows, at the entrance to offer visual

Table 1—T-Test for Mean Scores on Five Experimental Variables for 32 Interior Spaces.

Exp. No.	Space Name	Research Method	Experimental Variables									
			FUNC ID ^a		V-LOC ID ^b		H-LOC ID ^b		LOC ID ^a		USE FQ ^a	
			$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
1	Pinball Room (G1)	R1 (N=25) ^c R2 (N=50)	7.84 5.20 *	0.55 3.79	3.92 2.64 *	0.28 1.91	1.56 2.56 *	1.90 1.91	5.48 5.20	1.98 3.80	1.04 1.12	1.92 1.35
2	Billiard Area (G1)	R1 R2	8.00 7.00 *	0.00 2.26	3.96 3.68	0.20 1.10	2.96 3.08	1.72 1.16	6.92 6.74	1.80 2.14	1.60 1.68	1.73 1.58
3	Pingpong Room (G2)	R1 R2	6.24 2.64 *	2.33 3.76	3.44 1.36 *	1.33 1.91	1.60 1.20	2.00 1.75	5.04 2.56	2.76 3.63	0.56 0.68	1.08 1.32
4	Bowling Area (G1)	R1 R2	8.00 7.36 *	0.00 2.19	3.68 3.68	1.11 1.10	3.04 3.56	1.59 1.18	6.72 7.24	2.41 2.22	2.00 2.12	1.92 1.59
5	Forum Hall (Bottom)	R1 R2	6.32 6.72	3.25 2.96	2.76 3.36	1.74 1.48	2.84 3.30	1.75 1.47	5.60 6.66	3.46 2.95	2.32 2.28	2.21 1.51
6	SGA Office (G2)	R1 R2	4.48 5.12	3.52 3.66	2.76 2.72	1.69 1.89	2.56 2.50	1.58 1.78	5.32 5.22	3.24 3.64	0.40 0.76	1.00 1.45
7	Catskeller (G2)	R1 R2	5.92 6.08	3.14 3.30	2.88 3.10	1.72 1.67	2.44 2.70	1.76 1.53	5.32 5.80	3.31 3.16	1.52 1.76	1.76 1.79
8	Vending Area (G1)	R1 R2	6.48 5.32	2.60 3.71	3.12 2.72	1.39 1.89	2.72 2.36	1.62 1.74	5.84 5.08	2.85 3.57	1.84 1.36	1.82 1.43
9	Bookstore (Bottom)	R1 R2	7.60 7.68	1.63 1.58	3.72 3.84	0.84 0.79	3.68 3.74	0.99 0.83	7.40 7.58	1.71 1.59	4.80 4.60	2.24 2.11
10	Forum Hall (Top)	R1 R2	1.92 4.12 *	3.24 4.01	1.24 2.08	1.72 2.02	1.32 2.08	1.82 2.02	2.56 4.16	3.39 4.04	0.80 1.32	1.73 1.54

Table 1—Continued.

Exp. No.	Space Name	Research Method	Experimental Variables									
			FUNC ID ^a		V-LOC ID ^b		H-LOC ID ^b		LOC ID ^a		USE FQ ^a	
			$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
11	Library (G3)	R1 (N=25) ^c	1.12	2.46	0.88	1.62	0.60	1.41	1.48	2.92	0.16	0.55
		R2 (N=50)	2.24	3.49	1.20	1.85	1.10	1.72	2.30	3.56	0.20	0.83
12	TV Lounge (G1)	R1	7.28	1.72	3.72	0.98	3.56	0.87	7.28	1.75	1.44	1.87
		R2	6.88	2.72	3.52	1.31	3.02	1.24	6.54	2.49	1.24	1.56
13	Little Theater (G2)	R1	6.08	3.49	2.84	1.77	2.72	1.90	5.56	3.65	1.28	1.28
		R2	6.64	2.98	3.36	1.48	2.98	1.39	6.34	2.83	1.56	1.23
14	Art Gallery (G1)	R1	7.04	2.65	3.36	1.50	3.20	1.50	6.56	2.96	2.64	2.36
		R2	5.44	3.77	2.72	1.89	2.40	1.82	5.12	3.62	2.40	2.21
15	Information Desk (G1)	R1	7.84	0.55	4.00	0.00	4.00	0.00	8.00	0.00	2.00	2.00
		R2	5.92*	3.43	3.04*	1.73	2.98*	1.71	6.02*	3.43	1.84	2.55
16	Business Office (G1)	R1	7.68	1.60	3.60	1.16	3.56	1.16	7.16	2.03	2.40	2.16
		R2	6.84	2.80	3.44	1.40	3.40	1.41	6.84	2.80	1.80	1.63
17	Cafeteria (G1)	R1	7.92	0.40	4.00	0.00	4.00	0.00	8.00	0.00	4.40	2.30
		R2	7.92	0.57	4.00	0.00	3.78*	0.42	7.78*	0.42	4.48	2.73
18	Bookstore (Top) (G1)	R1	8.00	0.00	3.92	0.40	3.88	0.44	7.80	0.82	5.04	2.17
		R2	7.80	1.16	3.92	0.57	3.68	0.68	7.60	1.18	5.00	1.99
19	Rooms 204-209 (G3)	R1	3.68	3.09	2.64	1.80	1.88	1.90	4.52	3.49	0.88	1.01
		R2	3.44	3.70	1.92	2.02	1.52	1.64	3.44	3.64	0.56	0.99
20	Rooms 202-203 (G3)	R1	2.24	3.07	2.04	1.95	0.64	1.14	2.68	2.68	0.08	0.40
		R2	1.68	2.90	1.04*	1.77	0.84	1.45	1.88	3.21	0.24	0.66

Table 1—Continued.

Exp. No.	Space Name	Research Method	Experimental Variables									
			FUNC ID ^a		V-LOC ID ^b		H-LOC ID ^b		LOC ID ^a		USE FQ ^a	
			$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
21	Key Room (G3)	R1 (N=25) ^c	0.00	0.00	0.88	1.62	0.16	0.55	1.04	1.99	0.00	0.00
		R2 (N=50)	0.40	1.61	0.24 *	0.96	0.18	0.75	0.42	1.69	0.04	0.28
22	Bluemont Room (G3)	R1	2.24	3.18	1.76	1.89	0.60	1.08	2.36	2.72	0.08	0.40
		R2	2.52	3.47	1.44	1.94	1.00	1.44	2.44	3.33	0.12	0.48
23	Ball Room (G2)	R1	4.32	3.45	2.52	1.94	1.72	1.82	4.24	3.52	0.28	0.79
		R2	5.12	3.53	2.80	1.85	1.90	1.34	4.60	3.18	0.44	0.84
24	K.S.U. Room (G3)	R1	0.48	1.76	0.60	1.41	0.16	0.80	0.76	1.94	0.00	0.00
		R2	1.48	3.05	0.80	1.62	0.52	1.13	1.34	2.75	0.36	1.05
25	Cottonwood Room (G3)	R1	2.56	2.97	1.88	2.01	0.32	0.90	2.20	2.29	0.08	0.40
		R2	1.52	2.73	1.04	1.77	0.66	1.19	1.70	2.92	0.08	0.39
26	Sunflower Room (G3)	R1	3.12	3.11	2.72	1.90	0.84	1.28	3.56	2.74	0.40	0.82
		R2	1.16 *	2.32	0.88 *	1.67	0.58	1.14	1.46 *	2.79	0.12	0.48
27	Flint Hills Room (G3)	R1	1.76	2.73	1.96	1.95	1.23	0.25	2.48	2.74	0.24	0.66
		R2	1.12	2.18	0.88 *	1.67	1.24	0.18	1.52	2.90	0.12	0.48
28	Rooms 212-213 (G3)	R1	2.88	3.06	2.32	1.89	1.00	0.20	2.80	2.50	0.08	0.40
		R2	2.28	3.28	1.36 *	1.91	1.43	0.20	2.36	3.31	0.40	0.81
29	Big Eight Room (G3)	R1	3.28	3.55	2.36	1.98	1.12	1.64	3.48	3.23	0.56	0.92
		R2	2.68	3.65	1.44	1.94	1.02	1.55	2.48	3.41	0.60	1.09
30	Cats Pause Lounge (G1)	R1	6.48	1.66	3.60	1.12	1.92	1.68	5.52	2.33	1.56	2.08
		R2	3.08 *	3.84	1.60 *	1.98	1.34	1.77	2.94 *	3.69	0.68 *	1.38

Table 1—Continued.

Exp. No.	Space Name	Research Method	Experimental Variables									
			FUNC ID ^a		V-LOC ID ^b		H-LOC ID ^b		LOC ID ^a		USE FQ ^a	
			$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
31	Activities Center (G2)	R1 (N=25) ^c	2.72	3.74	1.20	1.76	1.24	1.86	2.44	3.58	0.24	0.88
		R2 (N=50)	4.08	3.98	2.08	2.02	2.02	1.97	4.10	3.99	0.28	0.70
32	Copy Center (G2)	R1	2.72	3.74	1.32	1.89	1.44	1.96	2.76	3.80	0.64	1.25
		R2	3.04	3.92	1.52	1.96	1.40	1.89	2.92	3.81	0.96	1.53

^aThe figures are mean scores of experimental variables on the 8-point experimental rating scale. FUNC ID means Functional Identification. LOC ID means Location Identification. USE FQ means Frequency of Use.

^bThe figures are mean scores of the two subvariables of Location Identification on the 4-point experimental rating scale. V-LOC ID means Vertical Location Identification. H-LOC ID means Horizontal Location Identification.

^cN signifies sample size in this table.

NOTES: $\bar{x}$ =mean, s=standard deviation, R1=the picture identification test, R2=the map drawing test. *=significantly different from R1 samples; it indicates significant difference at $p < .05$. (G1)=the open spaces, (G2)=the spaces whose entrance offering see-through-glass visibility, (G3)=the spaces having covert entrance.

access from outside. There are eight spaces in this category which are assumed to be at the secondary level of entrance visibility and are marked as (G2) in Table 1. 3) The Concealed Entrance: The space in this category hardly offers visual access because of the use of opaque material, such as wooden doors, to conceal the inside space. This is assumed to be at the tertiary level of entrance visibility. There are eleven spaces in this category, marked as (G3) in Table 1.

To test Hypothesis No. 1, these three categories indicate three different levels of entrance visibility which were significantly different from each other in the three experimental variables of the picture identification test.

As the outcome of multiple comparisons between these three categories shows, Table 2 confirms the assumption and therefore substantiates Hypothesis No. 1 by the unanimously significant differences found between these three categories in each experimental variable. This clearly supports the notion that better entrance visibility offers a better chance of being understood, oriented and used. It is a confirmation of the three functions of architectural visibility.

Correlations of the Three Functions of Visibility

Since the correlations between frequency of use and 1) functional identification ($r=.53, P<.01$) and 2) location identification ($r=.63, P<.01$) are lower than the correlation between functional identification and location identification ($r=.89, P<.01$), it seems that frequency of use may not be the most important factor in influencing human image-forming behavior. Thus, Hypothesis No. 2 is rejected. In

Table 2—The Multiple Comparisons between Mean Scores of Three Groups of Interior Spaces with Different Levels of Entrance Visibility.

Research Method	Spatial Group	Experimental Variables ^a					
		FUNC ID		LOC ID		USE FQ	
		$\bar{x}$	se	$\bar{x}$	se	$\bar{x}$	se
R1	(G1) N=325 ^c	6.37 ^b	0.137	6.22	0.135	2.36	0.070
	(G2) N=200	4.93	0.168	4.76	0.166	1.09	0.086
	(G3) N=275	2.05	0.137	2.13	0.135	0.35	0.070

^aAll figures are mean scores of experimental variables on the 8-point experimental rating scale. FUNC ID means Functional Identification. LOC ID means Location Identification. USE FQ means Frequency of Use.

^bAll values are significantly different at $p < .01$ in this table.

^cN signifies number of data points per group rather than sample size.

NOTES: $\bar{x}$ =mean, se=standard error, R1=the picture identification test. (G1)=the open spaces, (G2)=the spaces whose entrance offering see-through-glass visibility, (G3)=the spaces having covert entrance.

addition, because of the highly significant correlation between functional identification and location identification ($r = .89$, $p < .01$), Hypothesis No. 3 is accepted. This means that the memory of the functions of an interior space may be associated highly with the memory of its location.

The Imageable Priority of Location

In order to fulfill the third research goal, dealing with the imageable priority of location of interior spaces, two research methods, (1) a map drawing test and (2) observation, were employed.

The main corridors, the main choice points and the main entrances were defined through the author's observations. The interior spaces around the main corridors are shown in Fig. 8. The interior spaces near the main choice points and the main entrances are shown in Fig. 9.

To test Hypothesis No. 4, dealing with the interior spaces around the main corridors which were assumed to be better understood, oriented and used than the interior spaces elsewhere in the map drawing test, T-Test comparisons have been calculated and are shown in Table 3. This supports Hypothesis No. 4 because of the unanimously significant differences found in the three experimental variables. In addition, Hypothesis No. 5, which studies the imageable priority of the three groups of interior spaces around the main corridors is supported by data in Table 4. (G 41) denotes the spaces near the main entrances, (G 42) denotes the spaces near the main choice points, and (G 43) denotes the rest areas around the main corridors. The data confirms that the imageable priority of these three groups should be as follows: (G41)/(G42)/(G43), ranging from highest to lowest. In other words, like

Table 3—T-Test for Mean Scores of Spatial Groups Around the Main Corridors vs. Groups Elsewhere.

Research Method	Spatial Group	Experimental Variables ^a					
		FUNC ID		LOC ID		USE FQ	
		$\bar{x}$	se	$\bar{x}$	se	$\bar{x}$	se
R2 (N=50) ^b	(G4)	5.26	0.117	5.11	0.114	1.71	0.062
	(G5)	4.39 *	0.095	4.32 *	0.092	1.29 *	0.050

^aAll figures are mean scores of experimental variables on the 8-point experimental rating scale. FUNC ID means Functional Identification. LOC ID means Location Identification. USE FQ means Frequency of Use.

^bN signifies sample size in this table.

NOTES: $\bar{x}$ =mean, se=standard error, R2=the map drawing test. (G4)=the spaces around the main corridors, (G5)=the spaces not around the main corridors. *=significantly different from (G4) samples; it indicates significant difference at $p < .01$.

Table 4—The Multiple Comparisons for Mean Scores of Three Spatial Groups.

Research Method	Spatial Group	Experimental Variables ^a					
		FUNC ID		LOC ID		USE FQ	
		$\bar{x}^*$	se	$\bar{x}^*$	se	$\bar{x}^*$	se
R2 (N=50) ^b	(G41)	7.07	0.201	7.02	0.194	2.85	0.116
	(G42)	5.21	0.221	4.93	0.212	1.07 e	0.127
	(G43)	4.19	0.156	4.05	0.150	1.34 e	0.090

^aAll figures are mean scores of experimental variables on the 8-point experimental rating scale. FUNC ID means Functional Identification. LOC ID means Location Identification. USE FQ means Frequency of Use.

^bN signifies sample size in this table.

NOTES: $\bar{x}$ =mean, se=standard error, R2=the map drawing test. (G41)=the spaces near the main entrance, (G42)=the spaces near the main choice points, (G43)=the spaces just around the main corridors. * means not having same superscript e are significantly different at $p < .05$.

entrance visibility, the location of an interior space (whether near a main visual element or not) may significantly influence its imageability. Hypothesis No. 6 was set for studying whether the image priority of vertical levels in the K-State Union exists. This priority is decided by the vertical distance of the level to the main entrance, the shorter the better. Table 5 shows that the mean scores of the spaces on the ground level for each experimental variable are even better than those on the main floor. The data do not support the above hypothesis. Meanwhile, the mean scores of the spaces on the recreation level are also not significantly different from those on the main floor in each experimental variable except in frequency of use. It seems that the vertical location of the interior space does not crucially influence its imageability in this building. The discontinued stairway near the courtyard and the direct visibility possible when looking down from the first floor through the open courtyard to the ground floor may share the answer of this finding. In other words, if the building offers physical and visual access to some areas, the user may not notice the vertical distance from the main entrance.

Comparison Between the Two Research Tests

Since the picture identification test R1 and the map drawing test R2 employ the same experimental variables in this research, statistical comparisons between them are provided to study whether the subjects' response is the same. From Table 6, the variables of functional identification and location identification in these two tests are significantly different, while the frequency of use is not. The explanation of this statistical outcome may provide the reference for

Table 5—The Multiple Comparisons Between Mean Scores of Spatial Groups on Five Levels of K-State Union.

Research Method	Spatial Group	Experimental Variables							
		FUNC ID ^a		V-LOC ID ^b		H-LOC ID ^b		LOC ID ^a	
		$\bar{x}^*$	se	$\bar{x}^*$	se	$\bar{x}^*$	se	$\bar{x}^*$	se
R2 (N=50) ^c	(F1)	5.55 e	0.241	2.84 e	0.127	2.60 f	0.113	5.44 f	0.237
	(F2)	6.18 e	0.216	3.15 e	0.113	2.92 e	0.101	6.07 e	0.212
	(F3)	5.98 e	0.161	3.03 e	0.085	2.82 ef	0.075	5.86 ef	0.158
	(F4)	2.21	0.139	1.29	0.073	0.93	0.065	2.22	0.137
	(F5)	3.56	0.341	1.80	0.179	1.71	0.160	3.51	0.335

^aThe figures are mean scores of experimental variables on the 8-point experimental rating scale. FUNC ID means Functional Identification. LOC ID means Location Identification. USE FQ means Frequency of Use.

^bThe figures are mean scores of the two subvariables of Location Identification on the 4-point experimental rating scale. V-LOC ID means Vertical Location Identification. H-LOC ID means Horizontal Location Identification.

CN signifies sample size in this table.

NOTES: $\bar{x}$ =mean, se=standard error, R2=the map drawing test. (F1)=the recreation level, (F2)=the ground level, (F3)=the first floor, (F4)=the second floor, (F5)=the third floor. * means not having same superscript e or f are significantly different at $p < .05$.

Table 6—T-Test for Mean Scores of Experimental Variables by two Research Methods.

Research Method	Experimental Variables									
	FUNC ID ^a		V-LOC ID ^b		H-LOC ID ^b		LOC ID ^a		USE FQ ^a	
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
R1 (N=25) ^c	4.82	3.59	2.68	1.81	1.98	1.88	4.65	3.41	1.29	2.00
R2 (N=50)	4.39 xx	3.85	2.29 xx	1.98	2.03	1.83	4.32 x	3.77	1.28	1.92

^aThe figures are mean scores of experimental variables on the 8-point experimental rating scale. FUNC ID means Functional Identification. LOC ID means Locational Identification. USE FQ means Frequency of Use.

^bThe figures are mean score of the two subvariables of Location Identification on the 4-point experimental rating scale. V-LOC ID means Vertical Location Identification. H-LOC ID means Horizontal Location Identification.

^cN signifies sample size in this table.

NOTES: R1=the picture identification test, R2=the map drawing test. $\bar{x}$ =mean, s=standard deviation, x=significantly different from R1 sample at $p < 0.1$, xx=significantly different from R1 at $p < .05$.

further study and is illustrated based on each experimental variable shown as follows:

1) Functional Identification: It is clear that to ask a person to judge the inner functions of an interior space by a picture of its entrance is easier than asking the subject to draw a map of the space according to his personal image. The picture offers visual hints or distinctions to help the subject's judgment or association and thus avoids personal neglect or forgetfulness which might occur in the map drawing test. It also provides the chance to guess for the subject who has never been in the space but can judge its inner functions through the picture of its entrance. Therefore it is quite understandable that the mean score of functional identification in R1 is significantly higher than it is in R2.

2) Location Identification: As one of the subvariables of location identification, the mean scores in Table 6 of horizontal location identification are not significantly different in R1 and R2. But the mean scores of vertical location identification, as the other sub-variable of location identification, are significantly different. This causes the significant difference of location identification in these two tests. Compared with the map drawing test, the subject can easily identify the level of a space in the picture identification test. However, this does not provide a better chance for him to judge the horizontal location of the space. One meaningful finding the author discovered in the process of conducting these two tests can explain this phenomenon. Since uniform non-alphanumeric symbols, such as the color and texture of wall paper and rugs, can be found on the same levels of the K-State Union, many subjects judge the level of an interior space by

the uniform visual distinction shown in the picture of its entrance. However, they might not identify its horizontal location at all. The reason for this may be the crucial answer which explains the significant difference of vertical location identification found between R1 and R2. In dealing with providing distinctive levels in a large building, the K-State Union is obviously a successful example.

3) Frequency of Use: The very close mean scores of frequency of use in R1 and R2 show no significant difference found between them, as shown in Table 6. This confirms the convergent validity existing in these two tests related to frequency of use.

Other Findings

There are other findings in this research which share the answers of the different respondents in the two research tests. These findings include the low imageability of some levels in the K-State Union and the interaction between the entrance visibility and the location of the interior space.

The Open Space in the "Poor Imageable Area"

Since interior spaces in the meeting area on the second floor of the K-State Union generally have poor entrance visibility and few visual distinctions, this caused many subjects confusion in judging the horizontal location of each interior space in this area. As the only open space in this area, the Cats Pause Lounge was responded to in a significantly different manner by the subjects of the two tests, as shown in Table 1. (See interior space No. 30 in the Table). The mean score of each experimental variable of this space in R1 is significantly

higher than those scores in R2. The exception is the variable of horizontal location identification. This illustrates the fact that if a highly visible space is located in a poor imageable area, it is easy to forget in a map-drawing test, although it may be easily recognized through a picture of its entrance. The source of the confusion is a lack of association with adjacent spaces.

Discontinued Stairway

In this research, the spaces on the second and third floors of the K-State Union have significantly lower mean scores in each of the experimental variables of the map drawing test (as F4 and F5 show in Table 5). Why? There is a stairway near the open courtyard, which connects the ground floor and first floor, but it doesn't continually connect with the second and third floors. This factor may be one significant answer to the above question. In the author's opinion, if this stairway, which has a significant location - directly facing the main entrance hall and near the courtyard - also connected with the second and third floors, then it would encourage the user to use the interior spaces on these two floors. This is an example of the defects of circulation discontinuity in architectural visibility.

The Spaces Around the Main Corridors Have Poor Imageability

Although the mean scores of the spaces around the main corridors are significantly higher than those which are not in each experimental variable as shown in Table 3, the Browsing Library and the upper part of the Forum Hall, two spaces around the main corridors, have significantly lower mean scores of each variable (as No. 10 and No. 11 shown in Table

1) compared with the mean scores of the spaces not around the main corridors (as G5, shown in Table 3). The reason for this that is the entrances of these two spaces offer poor entrance visibility or do not directly face the adjacent main corridor. Giving an interior space a better location would not definitely enhance the imageability of this space if it correlates poorly with the entrance visibility.

Conclusion

This research confirms two major assumptions dealing with entrance visibility and the imageability of interior spaces. Two research methods were used: a picture identification test and a map drawing test. Entrance visibility was found to influence the users' understanding, orientation and use of interior spaces, especially spaces located near significant circulation elements, such as the main choice points and the main corridor. The imageability of these spaces depended on these circulation elements in their order of importance: the main entrance, the main choice point and the main corridor, respectively.

The findings also indicate that vertical location of interior space in the K-State Union may not be the most important determinant of imageability. An important reason for this may be the stairway near the courtyard which does not connect continually with the second and third floors in this building.

Frequency of use, as a potential facilitator of familiarity with the environment, seems to bear no crucial influence in image formation. However, the frequency of exposure to spaces while negotiating the environment for other reasons may influence knowledge of spaces not used. This issue was not studied in this research.

It is surmized that many factors influence the imageability of an environment. Examples include the circulation pattern of a building, spatial organization, and the service program. This research offers an example of how to simplify this complex interaction of variables within both time and research scope constraints.

The visibility of interior elements also influence the imageability of an entire building during the perception phase of the image-forming process discussed in part one of this thesis. In some situations, such as in a museum, an airport station or a department store, this environmental characteristic is important to guide the user's direction finding and orientation. One example of how to achieve optimum visibility in a combination of different circulation elements (entrance hall, courtyard, stairways) is found in the National Art Gallery in Washington, D.C. (see Fig. 11). This building offers a good example of building visibility through interior design of a large building.

If we try to more precisely understand the visibility in large buildings, some concepts should be considered further. 1) Entrance Visibility is dependent upon the degree of opening of the entrance, its width, its color and its lighting conditions. Also important are the visual distances to each significant circulation element and the entrance angle facing them. The emphasis given to each of these elements may also influence entrance visibility. 2) The Visibility of the Circulation System mainly depends on the effective combination of circulation elements followed by their priority of location, the direction of circulation elements and their legibility. 3) Route Orientation depends on the aforementioned visibility of the circulation system; the number, direction, and length of route changes; the location

**THIS BOOK
CONTAINS SEVERAL
DOCUMENTS THAT
ARE OF POOR
QUALITY DUE TO
BEING A
PHOTOCOPY OF A
PHOTO.**

**THIS IS AS RECEIVED
FROM CUSTOMER.**

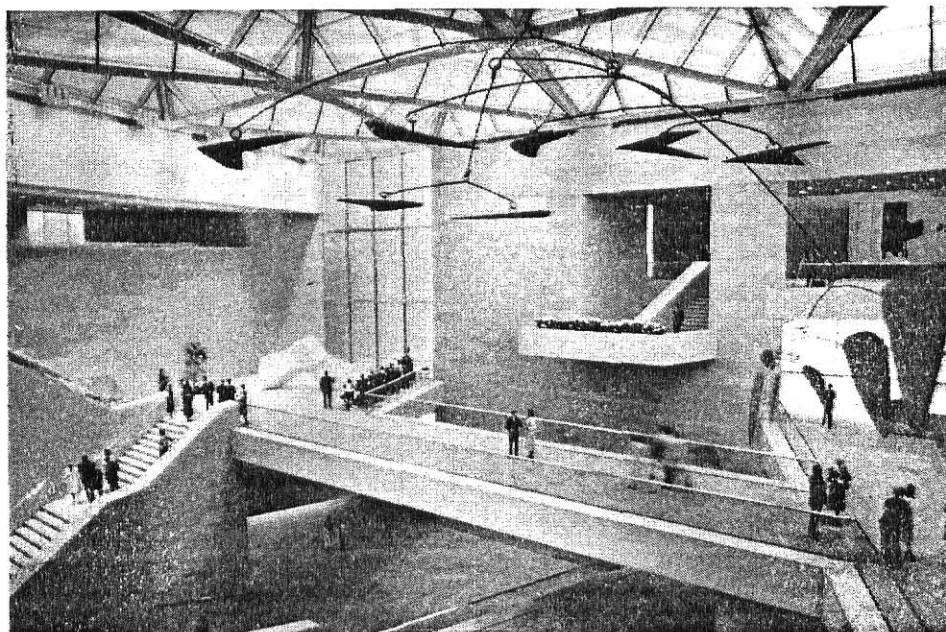


Figure 11
THE VISIBLE INTERIOR OF THE NATIONAL ART GALLERY
IN WASHINGTON, D.C.

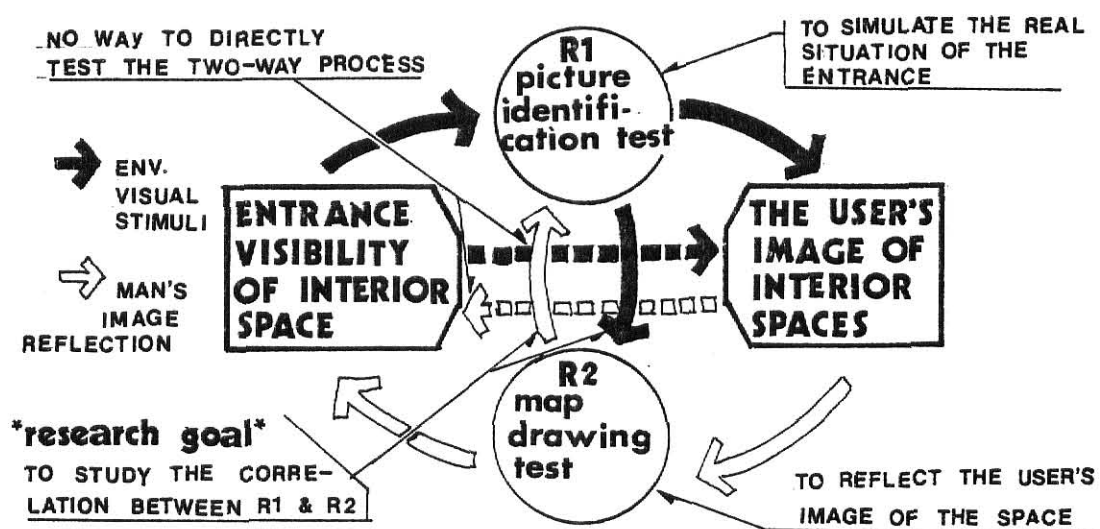


Figure 12
THE EXPERIMENTAL MODEL OF FURTHER RECOMMENDED RESEARCH

changes of stairways and the number of corridors meeting together at choice points along a given route. Also important is the efficiency of the circulation sign system along a route in a large building. 4) The Orientation of the Interior Space is determined by the entrance visibility of the interior space and the direction of the route from the main entrance of the building to this interior space.

Several weaknesses are found in this research: 1) the 50 subjects in this study were not controlled for sex, age, academic years nor major field of study. 2) Each subject in the picture identification test only responded to half of the pictures but not the same half. Therefore, a smaller sample of subjects was used for this data gathering method. 3) Judgments of the visibility of building entrance, the main corridor, the main choice points, and the entrances to the interior spaces were personally subjectively made by the author which may have biased the results somewhat.

Further Recommended Research

In order to more precisely study the relation between entrance visibility and the imageability of an interior space, the two research methods, 1) the picture identification test and 2) the map drawing test, were conducted in two separate groups of 50 randomly selected K-Staters. It is recommended that these be combined by using the same subjects in both research methods.

Each method tries to simulate or reflect real situations of environmental visibility and the user's image of the environment between which two-way communication cannot be directly tested (see Fig 12). In the recommended research, first let the subject do the map drawing test

(which depends highly on his image of the environment), then let him do the picture identification test. This might remind him of something he forgot in the former test. If so, the correlation test of each experiment variable in these two tests can provide a more precise opportunity to study the relations between entrance visibility and the imageability of interior spaces in large buildings.

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Appendix A

A MAP DRAWING TEST

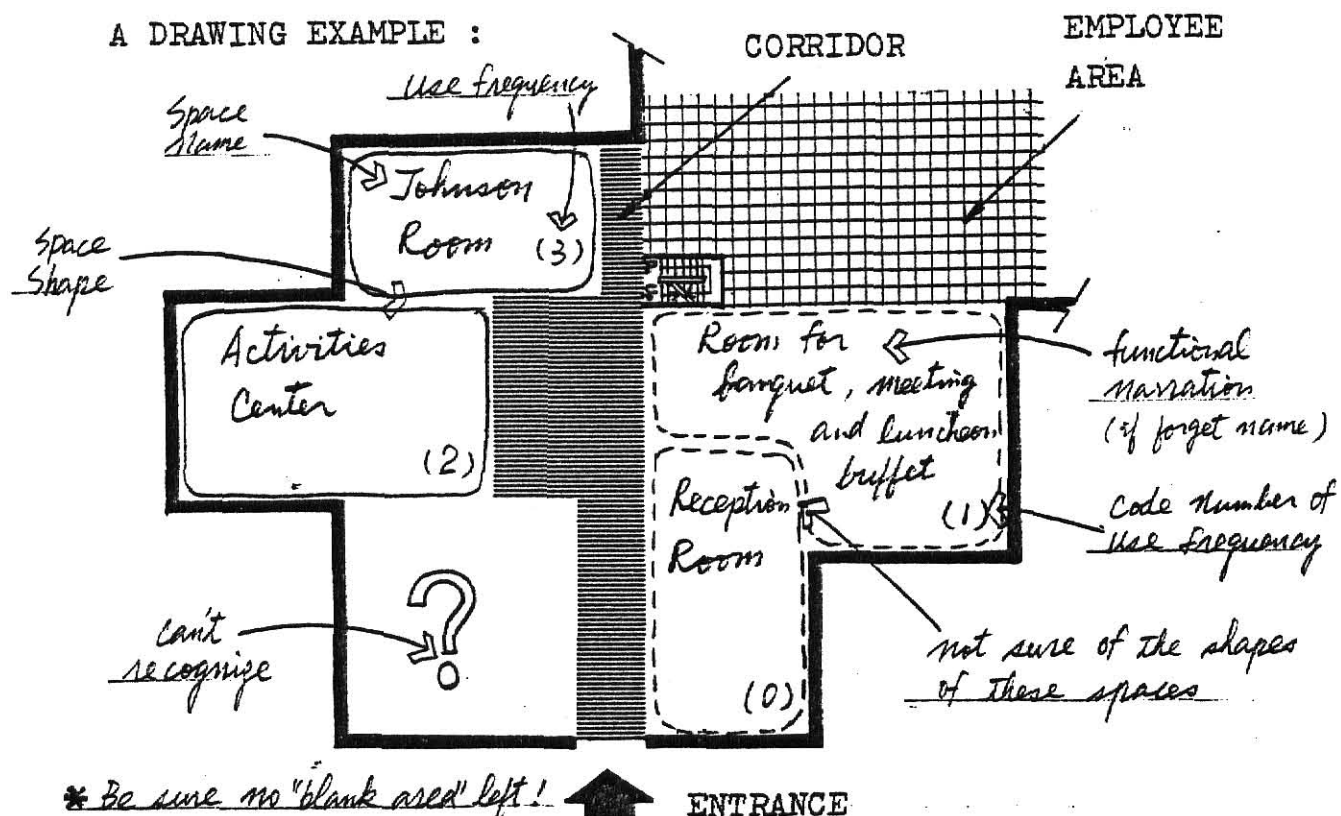
MAPS OF THE K-STATE UNION

This exercise is part of a study concerning the K-Stater's memory and use of the K-State Union. The study is an attempt to further define the link between the environmental characteristics of each space in the Union and the K-Stater's image of it. Information gain from this study should contribute to architects' effort to improve the design quality of large buildings. Participation in this study through completion of the maps is completely voluntary. If you are interested in assisting this study, please follow the instructions given below. Thank you for your cooperation. Your participation is a significant and necessary contribution to this study.

INSTRUCTIONS:

Five incomplete maps of the K-State Union are provided. Your task is to sketch the location, shape, size and name of the spaces on each floor plan of the Union by using a pencil.

- 1) Start with the floor most familiar to you and estimate the location, shape and size of each space according to your memory and the hints of corridors, stairs and entrances.
- 2) Drawing the SHAPE of each space which you can remember. Use a DOTTED LINE (----) instead of a SOLID LINE (——) if you are not sure how to draw the shapes of some spaces. Please use the eraser to correct any errors you may make. If you do not recognize some parts of the map, just mark a QUESTION MARK (?) on them. An example of map drawing is provided as shown the following page.
- 3) Write the NAME or FUNCTIONS of each space within the shape you have drawn.



* Be sure no "blank area" left! ENTRANCE

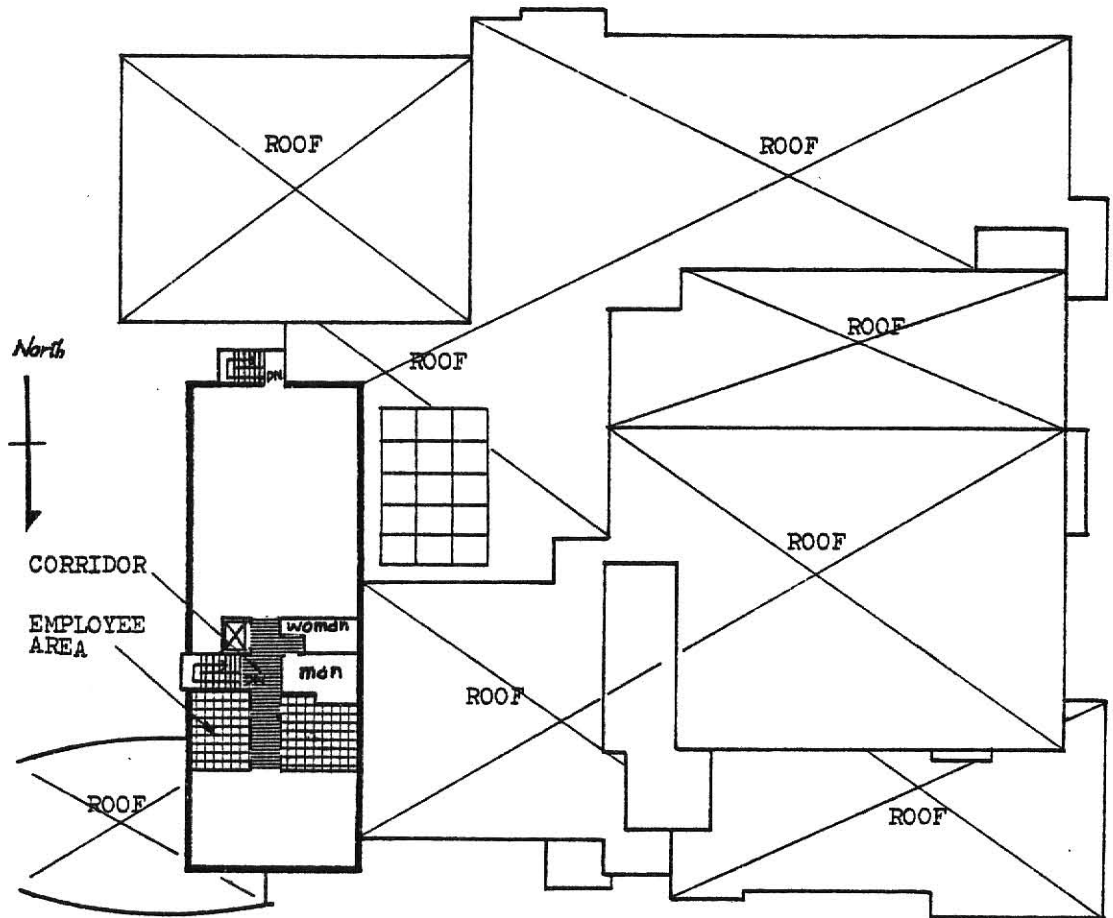
4) After you finish the map, please check it carefully.

You may then recall some names in your "question mark areas". After confirming that you have drawn the best map you can, please start the next map and repeat the same process until you complete all five maps.

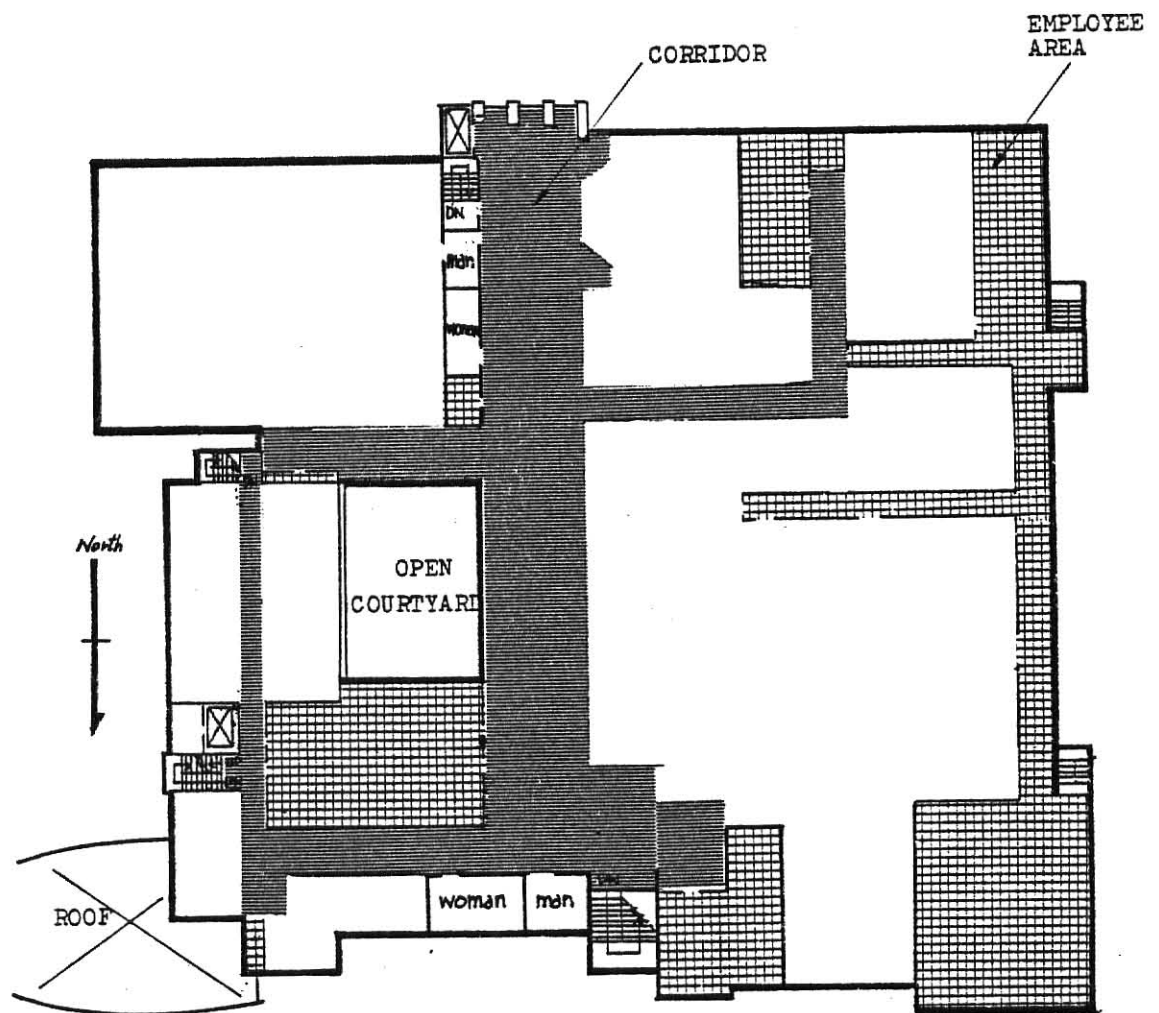
5) Please review all the maps again. Is there a space you drew on the wrong map or in the wrong direction? Are you sure you can't remember every space in your "question mark areas"? Can you still find some "blank areas" left?

6) After finishing your last check, please judge your FREQUENCY OF USE of each space you mapped and mark the proper code number on the lower right corner of the shape you drew. Use the following code numbers as indicators of your use frequency of each space:

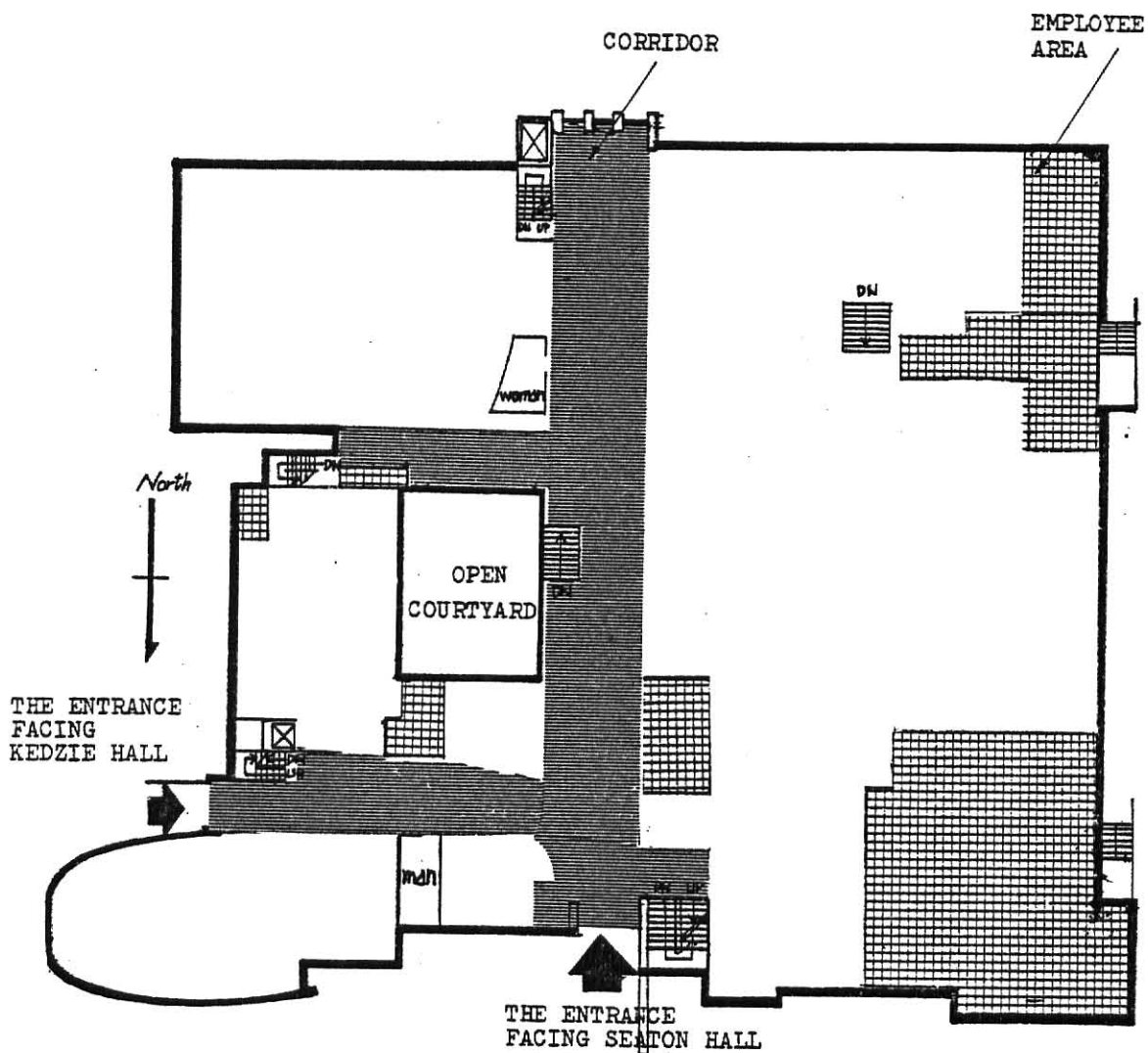
- | | |
|--------------------------|-------------------------------|
| (4) -- almost every day | (3) -- 2-3 times a week |
| (2) -- 2-3 times a month | (1) -- a few times a semester |
| (0) -- never | |



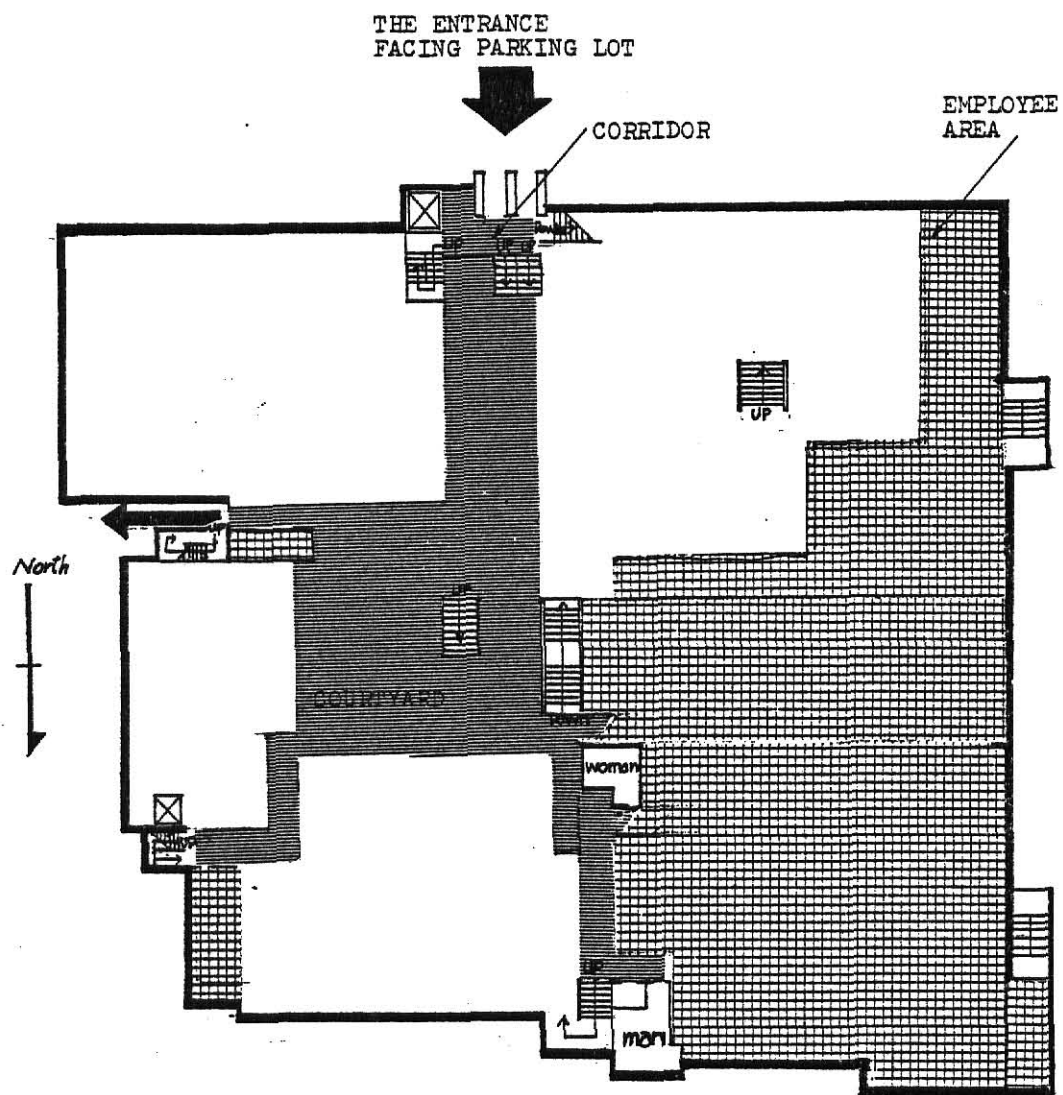
THIRD FLOOR



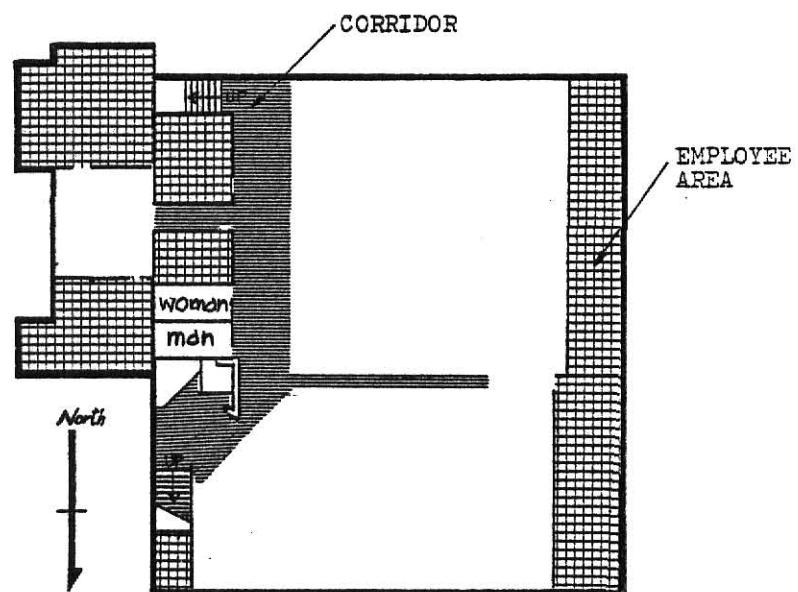
SECOND FLOOR



FIRST FLOOR



GROUND FLOOR



RECREATION LEVEL

Appendix B

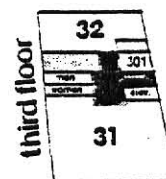
INTERVIEW SCHEDULE OF THE PICTURE IDENTIFICATION TEST

Standard Introduction

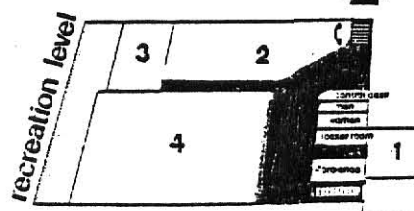
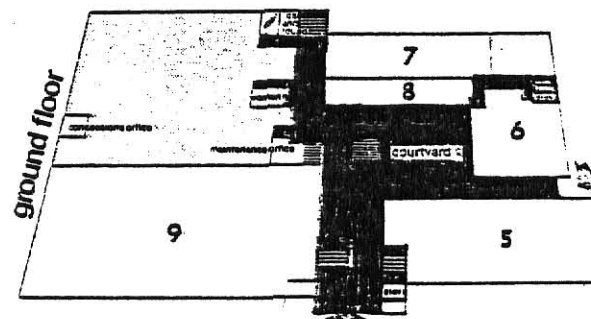
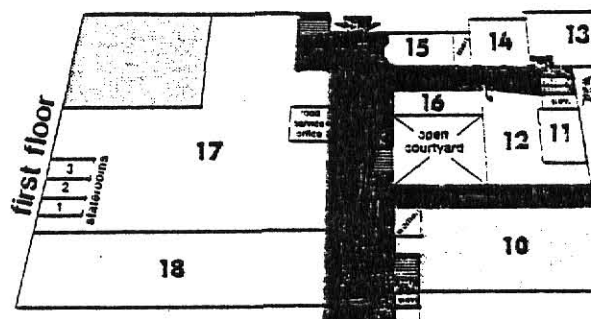
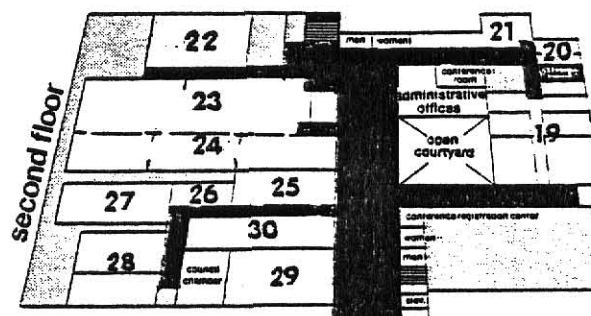
Hello, Sir/Ma'am. My name is Simon Kuo. What's your name? Oh, _____, how do you do? I am a graduate student in architecture and I'm doing research related to the use of the K-State Union by K-Staters. Would you mind spending about 20 minutes to answer questions through pictures of interior spaces in the K-State Union? Thank you for your cooperation.

Data Recording Process

1. Show him/her the picture of the entrance of an interior space (the order of these pictures is randomly arranged to fit the need of this experiment and avoid providing the chance of associating it with the real situation) and ask the question: "Could you tell me the name or the inner functions of this space?"
2. After the subject's answer, add: "Are you very sure?" (After each question answered by the subject, record his score following the policy of rating scale.)
3. "Can you tell me what level it is on? _____, Are you very sure?" (Record his score.)
4. Then show the subject the floor plan of the K-State Union on which each number indicates one interior space (see next page) and ask the subject: "Now, can you tell me the number indicating the horizontal location of this space? _____, are you very sure?" (Record his score.)
5. "Can you tell me the frequency with which you use this space? Almost every day? Two or three times a week? Two or three times a month? A few times a semester? Never?" (Record his score.)



TO IDENTIFY THE HORIZONTAL
LOCATIONS OF THE 32 INTERIOR
SPACES



6. Show the subject the next picture and repeat the same process shown as above until all the pictures have been shown and asked. The test is finished.
7. Tell the subject "_____, thank you very much and have a nice day!"

THE VISIBILITY OF INTERIOR
ELEMENTS OF COMPLEX BUILDINGS

by

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AN ABSTRACT OF A MASTER'S THESIS

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requirements for the degree

MASTER OF ARCHITECTURE

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1980

ABSTRACT

This thesis is comprised of two parts. First, the theoretical development which establishes a model of the image-forming process. Several environmental characteristics are derived from this model. The theory of architectural visibility, as one environmental characteristic derived from the perception phase of this model, has been intensively discussed including its functions, categories, elements, media and psychological and physiological criteria.

The second part describes an empirical research effort to test part of the theory. Two research methods are used: 1) a picture identification test and 2) a drawing test, to assess the entrance visibility and location of 32 interior spaces in the K-State Union. Six hypotheses are tested in this research. Hypothesis No. 1 confirms that entrance visibility does influence the user in understanding, orienting and using interior spaces. Hypothesis No. 2 is not supported which demonstrates that frequency of use is not the most important factor influencing the human image-forming process. Hypothesis No. 3 confirms that memory of the functions of an interior space is highly associated with its location. Hypothesis No. 4 confirms that interior spaces around main corridors have a better chance of being understood, oriented and used than interior spaces elsewhere. Hypothesis No. 5 confirms that location of an interior space significantly influences its imageability. Hypothesis No. 6 is not supported which shows that vertical location of the interior space does not influence its imageability.