DEVELOPMENT OF A CAMPUS IMAGE: A STUDY IN CAMPUS PERCEPTION AND LEGIBILITY

by

CRAIG MARC FRIEDMAN

B.S. Pennsylvania State University, 1980

A MASTER'S THESIS

Submitted in partial fulfillment of the

requirements of the degree

MASTER OF ARCHITECTURE

Department of Architecture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1982

Approved by:

Ray B. Weisenburger

Major Professor

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ACKNOWLEDGMENTS

I would like to thank my committee members: Ray B. Weisenburger, Gary J. Coates and George A. Milliken for their time and assistance.

I would also like to thank the following individuals for their time and assistance in my research.

Thomas L. Brown, Prof. of Marketing

Gary Friedman, Architect

Judith E. Williams

CHAPTER 1

INTRODUCTION

Following the techniques of Lynch (1960), Gould (1966) and Appleyard (1970), many studies have shown the relationship between the physical environment and human cognitive processes. Cognitive representation allows individuals to give meaning to their observations and experiences. It also allows them to cope with the built environment in which they carry out their daily activities (Rapoport and Hawks, 1970).

First, object placement for campus elements are examined in this study by using a mislocation rating, distortion rating and distance score (close, medium and far) to analyze the respondents' sketch of the campus. Many cognitive mapping studies have neglected to examine the accuracy of object placement. An assessment of the campus was conducted by the researcher to determine how students perceive and understand the physical environment. The intent of this thesis was to demonstrate the effects of the campus environment on human perception.

Second, this study of human perception rests on the assumption that architects and planners can better understand the actions, needs and desires of students relative to the campus environment if they know how students perceive it. The key is to design the campus environment with human beings in mind. Decisions are made everyday concerning these problems without benefit of information on man-environment interactions. The quality of these decisions could be improved by supplying better information dealing with how people perceive and react to the campus environment. This study's methods are used to evaluate the existing campus environment and to supply information for future campus design. The information gained by using cognitive mapping may serve as a foundation upon which to build educated, informed solutions to campus design problems.

The objectives stated above may be realized by a careful examination of the following set of hypotheses.

1. There will not be many regularties among students' images of the Kansas State University campus when they are asked to sketch and identify physical characteristics.

2. Students living in Manhattan, Kansas for longer periods of time will not be able to identify any more physical characteristics or draw a more complete map of the campus than those students who have lived in Manhattan for shorter periods.

3. The location of his dormitory on campus, the first ten campus elements drawn on the sketch and their distance from the dormitory (close, medium and far) will not affect the subject's distortion and mislocation rating of the campus elements.

4. The factors of sex, age, education, urban/rural background, means of transportation around campus, college major, and income will not affect the students' percentage of the campus drawn nor the distortion and mislocation rating.

The four hypotheses of this study are written in the null hypothesis format. The null hypothesis is a statistical proposition which states that there is no relationship between the variables. Every experiment exists in order to give the facts a chance to disprove the null hypothesis (Fisher, 1951). In other words, "disprove me if you can." That is a succinct way to express the testing of obtained data against chance expectations. The null hypothesis in this study will be accepted or rejected after the data is collected and analyzed.

LITERATURE REVIEW

PHYSICAL SETTING COMPONENTS. Lynch (1960) was interested in how people use and understand the structure of cities. He analyzed data in terms of the presence or absence of five key elements: paths, districts, edges, nodes and landmarks. Paths are movement channels such as streets, walkways, transit lines, canals and railroads. Edges are linear elements not used as paths, such as barriers, walls, the coast and edges of development. Districts are areas identified by a common characteristic, such as ethnicity or wealth. Nodes are focal points where paths meet such as a crossing or convergence of paths, street corner hangouts or an enclosed square. Landmarks are points of reference, generally buildings, signs, stores or mountains. Lynch's conclusion was that people noticed the environment and were able to talk about it. They could also describe it and draw maps of it. In spite of subjective differences, there were many regularities among individual images.

Lynch (1960) also proposed that the physical characteristics of a city can be separated into three components-identity, structure and meaning. Identity requires both the perception of present elements and the memory of past elements (Bruner, 1957; Kaplan, 1973). Structure is defined as the collection of elements within the physical environment. The arrangement of elements in composing the physical environment determines the image. Elements include pattern, form, construction materials, landscaping, condition of upkeep, and building size. Each element has many connections to the other elements. Finally, the physical environment must have some practical or emotional meaning to the observer in order for him to differentiate and remember it.

This study will concentrate on the physical characteristics of the campus image so meaning will not be analyzed. Due to the subjectivity of multitudinous individual meanings of campus such as power, complexity, novelty, and mystery group images were deemed less likely to be consistent at the campus level. This was seen by the author as a complicated analytic feat beyond the scope of this thesis. Thus this study will examine physical characteristics relating to the attributes of identity and structure and their role in the mental images which individuals form of the Kansas State University campus.

Identity requires both the perception of present elements and the memory of past elements (Bruner, 1957; Kaplan, 1973). Several studies have found that individual differences are the result of a person's socialization experience. Identification of existing physical elements is a critical starting point for perception prior to any action (e.g., movement around the campus) being taken.

Structure is defined as the collection of elements within the campus environment. A campus element index and map of the campus appears in the appendix of this thesis. The arrangement of elements in composing the physical environment determines the image. Elements include buildings, parking lots, streets, sidewalks and landscaping. Each element has many connections to the other element. Furthermore, these connections vary in strength.

FAMILIARITY. There may be little in the campus environment that is ordered or remarkable, yet the mental image generated of it may gain identity and organization through familiarity. Familiarity with the campus areas has different effects on user perception. An environment frequented once a week does not produce as much effect as one frequented everyday over long periods of time. Saarinen (1964) explored how perceptions of the Chicago Loop were affected by individual familiarity with the area. It was found that people display different cognitive images as a function of their experience with the loop. Banerjee (1971) and Milgram et. al. also found that the longer a person lived in Boston, the greater the number of photographs of the city he could identify.

FILTER MODEL. The Filter Model (Figure 1) demonstrates how cultural and personal variables affect an individual's perception of the built environment (Rapoport, 1969, 1971). Perceptual data is filtered, amplified, weakened, transformed, arranged, ranked or eliminated until an image of the perceived

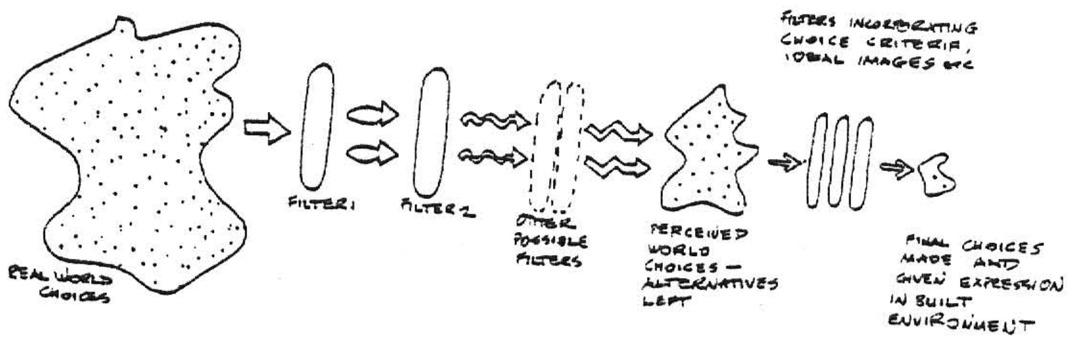


Figure 1
Filter Model

environment results. Many distortions, although individually variable, are also consistent and regular for given groups of people. A comprehension of images is an important element in the understanding of man-environment interaction. For example, the average Bostonian hardly knows the West End of Boston and thinks it to be a slum (Gans, 1971). Gans' view changed when he became a resident rather than a visitor. His perception of that environment became selective. Vacant buildings and boarded-up stores were no longer visible.

PERCEPTION OF THE PHYSICAL ENVIRONMENT. Perception may be used to describe the evaluation of the physical environment. It is the way in which people understand, structure and learn the physical environment and use mental maps to negotiate it (Rapoport, 1977).

Perception is affected by nature of the stimuli, the state of the organism, expectation, attention, motivation, selectivity, homeostasis or adaptation level. Evidence suggests that past history and experience, adaptation level, and culture all affect perception (Segail, 1966; Stacey, 1969; Wober, 1966).

Perception can be subject-centered (autocentric) and object-centered (allocentric) (Schachtel, 1959). Autocentric perception is concerned with how people feel. Allocentric perception deals with objectification and understanding; it involves attention and directionality. Autocentric perception differentiates among senses-taste, olfaction, tactility, thermal perception and proprioception-while allocentric perception deals with vision and hearing. Hearing is allocentric relative to speech and autocentric with regard to tone, music and sound. Vision is more autocentric with regard to colors and light.

Vision, olfaction, sound perception, tactility and kinesthetics are used by the individual in his perception of the built environment. Vision is the dominant sense in humans, and the one most studies in psychology and design. Orientation of the built environment is largely visual, although in some cases (Eskimos) it may involve olfactory, tactile and acoustic information (Carperter, 1959, 1973). Visual environment perception involves distance, textural gradients, light quality, color, shape and contrast gradients (Gibson, 1952). Olfaction is a primitive and immediately emotional sense. It can evoke powerful memories of places and can enrich the sense of place. Sound emphasizes space rather than objects. It lacks the precision of visual localization and orientation (Fisher, 1968). The physical environment contains many different sounds which are masked by ubiquitous traffic noise, which also has the potential to decrease hearing acuity. The tactile sense can distinguish among soft, hard, smooth and rough building material. Tactile texture can be reinforced by vision and sound, such as the lack of sound while walking on soft surfaces and the clicking of shoes on hard ones. There have been attempts to employ tactile cues in traffic control by using warning grooves on freeways or cobbles on slow speed streets. Kinesthetics is the experience of the body's displacement and movement through space, such as movement up or down slopes or stairs. It is manifest in changes in bodily orientation and is affected by whether such movement is active or passive.

COGNITIVE REPRESENTATION OF THE PHYSICAL ENVIRONMENT. Cognitive representation of the physical environment occurs in both propositional and analogical form (Kosslyn and Pomerantz, 1977; Kaplan, 1973; Evans, 1980). In the propositional model, people search for and comprehend the physical characteristics of a environment in relation to location and orientation decisions. The analogical view states that individuals are affected by previous general knowledge of the built environment.

A primary function of a cognitive image is to facilitate the individual's understanding and movement within the built environment. The cognitive representation of a environment gives meaning to what human beings observe and experience. It adds distinctiveness to the features of the built environment, and helps people cope with the environment (Rapoport and Hawks, 1970). It also helps people interpret information, navigate within the environment, identify objects, and to code practical or emotional meaning for the objects in the built environment (Lynch, 1960).

Environmental cognition is the study of images, impressions, and beliefs that people have of the physical environment and the ways in which these attitudes affect subsequent behavior within the built environment. The image of the physical environment may vary greatly among different observers. However, enough overlap exists in the characteristics and experiences of individuals to ensure that a common image results. Without this common image, orderly movement within the built environment would be impossible.

NOTICEABLE DIFFERENCES. Noticeable differences are those distinct elements perceived in the physical environment. For example, a tree in a forest is not usually seen as a noticeable difference unless it is very special or different, but a single tree in an urban setting is most noticeable and perceptually important (Moles, 1966). Evidence suggests that elements such as small parks, water views and open space in urban areas become noticeable differences and thus landmarks for orientation. The clearer, stronger and more salient the contrast, the greater the likeihood that these differences will be noticed.

METHODOLOGICAL ISSUES. Because so much variation exists in the kind of maps which have been used (Lynch maps, overlay maps, Gouldian aggregated preference maps), it is important to define what is meant by mental maps. Mental maps are sketch products created by subjects. They are used to find one's way around (to identify objects and to see their spatial relationships) and to code practical or emotional meaning (Lynch, 1960). Maps analyze the way in which spatial information is acquired, stored, decoded and applied to the compression of the everyday physical environment (Stea, 1974). A map sums up past experience and provides a platform for future behavior. The map is taken in the same concrete sense as a road map.

Other devices to extract environmental perception and legibility include verbal and written reports, sketches and free-flowing conversation. Lynch's work is a classic example of the use of cognitive mapping for extracting environmental knowledge. Lynch asked city dwellers to draw a quick map of their city as if they were describing it rapidly to a stranger. Next he asked them to list elements that stood out in the central business district, then to describe how they traveled through the area and their emotional reactions. Finally, Lynch combined the data in a graphic display which he called a cognitive map.

The use of cognitive maps as a source of data raises several methodological and procedural questions. The greatest methodolcgical problem is determining the degree to which the map is a valid representation of the existing physical environment. How accurate is a hand-drawn sketch when compared to the actual physical environment? A study examining this problem was done by Howard (1973). Howard had adults perform one of the following tasks in familiar outdoor surroundings: 1) draw a map of the environment, 2) place objects in scale models, 3) estimate object distances, and 4) make ratio estimates of object distances by marking off a standardized line in proportion to the real distance. All four methods were reliable, with reliability coefficients ranging from .987 to .995 (Evans, 1980). Similar results were found in a study by Rothwell (1976), in which adults were asked to draw their apartment floor plans. These two studies suggest good reliability and validity for hand-drawn maps. However, both studies neglected to examine the accuracy of object placement.

The use of cognitive mapping in research raises a number of procedural questions. For example, when an experimenter asks an individual to draw a sketch of the physical environment, he is asking for an exhibition of recall abilities and graphic and cartographic skills. A person with limited graphic and cartographic capabilities is restricted in the ability to show his knowledge. Appleyard (1970) suggests that this is not a problem when the subjects are adult humans with the ability to structure their thoughts in an abstract fashion to produce external representations summarizing their cognition. This does not apply to individuals who are sight impaired or physically unable to manipulate a writing instrument (selective discrimination).

There is also a tendency for the mapper to accumulate and exaggerate errors (Beck and Wood, 1976). For example, error created early in the base map is compounded because the mapper is unwilling to sacrifice the work made prior to the discovery of the error. The mapper may also fail to detect the error.

PERSONAL CHARACTERISTICS. Images are not only affected by the scale of the area involved (college campus, neighborhood or city), but also by such factors as age, familiarity, gender, education, income, class or culture, and the physical components of environments. Several dimensions of individual differences affecting people's mental images of the physical environment have been identified in the literature review.

Landmarks are selected differently by various people. The elderly often use landmarks which no longer exist while the young use new projects ignored by the older groups (Porteous, 1971; Rapoport, 1973). Also, some data suggests that landmarks are most likely to facilitate environmental comprehension by preschool children.

Subjectively, the same campus image could be classified as either an edge or a path, depending on the individual's role. For motorists it could be a path, for residents an edge. Age, health or income would affect a person's mobility and the availability of transportation to him. Thus, a major road seen as a path by commuters could be seen as an edge by the old, the very young, the handicapped or some other group bound by locality.

Most research on sex differences in spatial cognition has found few differences between genders until adolescence, when a slight male advantage emerges (Maccoby and Jacklin, 1974). Appleyard (1976) found that men drew slightly more accurate and extensive city maps than women. He attributed this to greater travel in and exposure to the city.

A class or cultural study compared neighborhood maps produced by lower-class black, chicano and white children living in the same neighborhood. Several ethnic differences emerged, such as greater neighborhood extent in white children's maps, the use of more human-made structures by white and chicano children, and more natural features used by black children. Class and cultural differences in environmental cognition may reflect different cognitive styles. Environmental experience and travel modes may explain these differences. At present it is difficult to demonstrate cultural or class differences in environmental cognition (Maurer and Baxter, 1972).

Several other studies show differences in imagery due to socioeconomic status. Income, occupation and education were used in these studies to measure this status. Individuals at higher socioeconomic levels tended to include more areas of a city in their cognitive maps. In other words, wealthier people are more familiar with a greater portion of their city than poorer people. There are two explanations for these results. First, this may be a reflection of the different modes of transportation (bus as opposed to car) which are more likely to be utilized by the lower socioeconomic classes. Also, residents of higher socioeconomic status tend to be more involved with historical settings and areas of scenic beauty. Secondly, individuals of lower socioeconomic status may have less practice drawing maps. This may account in part for the findings (Orleans, 1973; Los Angles Department of City Planning, 1971; Goodchild, 1974).

Eleven variables comprise the personal domain. These are sex, age, education level, urban/rural background, how the subject commutes around campus, college major, income, location of dormitory (close, medium and far) and years living in Manhattan, Kansas. It is important to assess whether a person's image of the campus is a result of the physical characteristics or these independent variables.

CHAPTER 2

RESEARCH DESIGN

METHODS OF PROCEDURE

SAMPLING OF RESPONDENTS. In this study every student in Edwards, Haymaker, Ford and Goodnow Hall on campus had an equal probability of being selected. The names of all the male and female students living in these dormitories were placed in a large bowl. The contents of the bowl was throughly mixed and then 42 female and 44 male respondents were randomly selected to be interviewed. This random sampling technique is an excellent vehicle for increasing the validity of the study.

Only students dwelling in dormitories were selected as respondents. By using this subgroup, instead of off-campus students and those living in fraternity and sorority houses,. the researcher hopes to improve the efficiency of the sample plan. The goal is to obtain estimates with the same consistency as a large sample, but with a smaller sample size. Because all these students live on campus they are possibly more familiar with the campus environment. Using dormitory students for the sample would also be more convenient for the researcher, owing to a lack of transportation and a small budget. Lastly, the subjects participating in this study only did so after having given their verbal consent.

SETTING. The university is located in Manhattan, Kansas, a town with a population of approximately 40,000. Edwards Hall is located on the northwest side of the campus; Goodnow Hall is located on the west side of the campus; and Ford and Haymaker Hall are located on the east side of the campus. A map of the Kansas State University campus appears in the appendix of this thesis.

THE INSTRUMENT. A face-to-face questionnaire was designed to measure the individual's cognitive image of the Kansas State University campus, his past experience and personal characteristics. The goal of the experimental procedure is to provide information on the importance assigned to campus characteristics as they relate to legibility. The questionnaire was pretested on twenty college students at Kansas State University and adjustments were then made. The corrected version of the questionnaire appears in the appendix of this thesis.

The first part of the questionnaire asked the subject to draw a cognitive map of the Kansas State University campus. The second part of the questionnaire dealt with the respondent's past experience and personal characteristics. It took approximately 30 minutes to administer the questionnaire to each respondent.

ANALYSIS

A mislocation rating, distortion rating, percentage of the campus drawn, and a rank order of the first ten campus elements drawn was used to analyze the respondent's sketch.

The mislocation rating measured the number of campus elements (buildings, parking lots, streets, and landscaping) mislocated on the sketch. It ranged from the element not being mislocated (1) to the element being very mislocated (3) on the sketch. The distortion rating measured the number of campus elements distorted by size on the sketch. It ranged from the element not being distorted (1) to the element being very distorted (3) on the sketch. A percentage of the campus known by the subject was obtained by adding the total number of campus elements drawn by the subject, and then dividing this by the actual number of campus elements. A rank order of the first ten campus elements drawn by the subject was measured for distortion and mislocation.

A list of the independent and dependent variables used in this study appears in table 1. Because the analysis of the data was conducted by using sample means, analysis of variance and regression was used in this study.

Table 1

A list of the independent and dependent variables used in this study.

INDEPENDENT VARIABLES
Campus
Age
Sex
Years living in Manhattan, Kansas
Urban/rural background
Education level
Income
College major
How the subject commutes around campus
Dormitory hall
First 10 campus elements drawn on the sketch
Distance from the dormitory hall (close, medium and far)

DEPENDENT VARIABLES
Cognitive map (sketch of the Kansas State University campus)
First 10 campus elements drawn on the sketch
.. distortion
.. mislocation
All elements drawn on the sketch of the campus
.. distortion
.. mislocation
Where the subject spends most of his time in a building or area on campus when not in class

The next chapter is a concise report of the general characteristics of the sample, response frequencies of the questionnaire, and research findings of this study, presented in response to the four hypotheses stated. To facilitate reader comprehension, each hypothesis is restated and immediately followed by those research results and discussion relating to it. Lastly, the study's limitations and implications for future research is discussed.

CHAPTER 3

RESEARCH FINDINGS

This study revealed useful insights leading to a better understanding of the campus environment by concentrating on students' perception of the campus, as mainfest in their preferences and legibility. How do students form impressions of the campus? Can this process be understood well enough for designers to predict the psychological effects of their work? This thesis has addressed these questions by determining how an individual's cognitive representation of the campus is related to his patterns of looking, and how these patterns in turn are related to the form of the campus.

Hypothesis 1

The physical characteristics of the campus most frequently recalled by all the respondents were Cardwell Hall, Seaton Hall, K-State Union, Farrell Library, Clafin Road and Mid Campus Drive. Campus elements mentioned infrequently included the creek, the Quinlin Natural Area, the grass field in front of Anderson Hall, the parking lots and Bushnell Hall. The campus elements in rank order drawn most often by all the subjects are shown in table 2.

These results are similar to those of Appleyard (1976) and Lynch (1960), who found that the elements people recalled most were the contour (the sharpness of a boundary or street) and the

Table 2

The campus elements in rank order drawn most often by all the subjects.

CAMPUS ELEMENTS	PERCENTAGE	CAMPUS ELEMENTS	PERCENTAGE
Cardwell Hall	96.5	Thompson Hall	47.7
Seaton Hall	91.9	Ward Hall	44.2
K-State Union	90.7	Edwards Hall	41.9
Clafin Road	90.1	Union Parking Lot	38.4
Farrell Library	89.5	International Student Center	38.4
Mid Campus Drive	88.4	Nichols	38.4
Waters Hall	84.9	Petticoat Lane	37.2
Anderson Hall	84.9	Greenhouses By Dickens Hall	37.2
Willard Hall	83.7	Lovers Lane	36.0
Denison Avenue	82.9	Art Building	36.0
Haymaker Hall	82.6	Holtz Hall	36.0
Ford Hall	81.4	Danforth & All-Faiths Chapel	34.9
Ahearn Field House	81.4	President's House	33.7
Ackert Hall	79.1	Dickens Hall	33.7
Denison Hall	77.9	Durland II (under construction)	33.7
Bluemont Hall	75.6	Mid Campus Sidewalk	32.6
West Hall	74.4	Student Recreation Center	31.4
King Hall	74.4	Jardine Terrace Apartments	31.4
Goodnow Hall	73.3	Parking Lot Behind Waters Hall	31.4
Moore Hall	73.3	Pittman Building	31.4
Eisenhower Hall	72.1	Leasure Hall	30.2
Fairchild Hall	72.1	Holton Hall	29.1
McCain Hall	72.1	Parking Lot By Ackert Hall	26.7
Durland Hall	68.6	Sidewalk By Ackert Hall	20.0
Marlatt Hall	67.4	Open Space By Anderson Hall	19.8
17th Street	66.3	KSU Stadium	19.8
Justin Hall	63.9	Campus Creek Road	18.6
Derby Food Center	62.8	Quinlin Natural Area	16.3
Throckmorton Hall	62.8	Oak Drive	16.3
Kedzie Hall	62.8	Parking Lot By Thompson Hall	15.1
Calvin Hall	60.5	Home Management Houses	15.1
Schellenberger Hall	60.0	Greenhouses By Throckmorton	14.0
East/West Stadium	60.0	Parking Lot By Call Hall	13.9
Lafene Student Health Center	58.1	Parking Lot By Weber Hall	13.9
Vattier Street	57.0	Old Dairy Barn	13.9
Van Zile Hall	55.8	Housing Maintenance Building	12.8
Anderson Hall	55.8	Creek	11.6
Veterinary Medical Complex	55.8	Hollis House	10.5
Burt Hall	55.8	Bushnell Hall	9.3
Umberger Hall	53.5	Trailers	9.3
Weber Hall	52.3	Fork Sculpture	8.1
Boyd Hall	52.3	Marching Band Field	8.1
Military Science Building	52.3	Washburn Intramual Complex	8.1
College Heights Road	51.2	Parking Lot By East/West Stadium.	8.1
Kramer Food Center	51.2	Stone Child Care Center	5.8
Manhattan Avenue	50.0	Stadium Parking Lot	4.7
Putnam Hall	50.0	Power Palnt Smoke Stack	4.6
Power Plant	48.9	Sidewalk By Veterinary Bldg.	2.3
Dykstra Hall	48.8	Grounds & Paint Shop	1.2
Call Hall	48.8		

size and shape of buildings. In spite of subjective differences, there were many regularities among individual images. Without this common image, orderly movement within the campus would be impossible. However, in the present study, the landscaping was not frequently mentioned. A possible explanation of this may be that the landscaping on campus is a subtle design feature. Perhaps the subjects interviewed didn't place a societal emphasis on nature and ecology or maybe they took the landscaping on campus for granted. Kaplan conducted several studies to determine preferential differences between natural and built environments. He showed respondents a series of slides depicting everyday scenes in the two environments and asked them to indicate their preference. He found that people vastly preferred the natural environment with its grassy areas and trees. In fact, in one study, the only urban slide enjoyed as much as the nature scenes was one depicting a few trees in a downtown park surrounded by tall buildings. Kaplan's studies demonstrated that nature and landscaping are important characteristics of preferred scenes. In the present study, landscaping was not perceived as very important. This is demonstrated by the small percentage of recall of the Quinlin Nature Area, the grass field in front of Anderson Hall, and the Marching Band Field.

According to Lynch (1960), landmarks are points of reference which must be highly visible and present noticeable differences from the area surrounding them. The Power Plant smoke stack is the tallest element on campus. It can be seen for miles away, but it was infrequently recalled by the subjects.

Apparently the subjects used the smoke stack as a reference point when not on campus but ignored it while on campus.

Table 3 shows the many regularities among individuals in the perception of non-classroom buildings. These buildings are considered nodes by Lynch (1960) because they are the places where the student population lives or engages in social activities.

Table 3

Percentage distribution of the buildings mentioned by dormitory when not in class.

ORD HALL	%	HAYMAKER HALL	%	EDWARDS HALL	%	GOODNOW HALL	%
ord Hall	45.16	Haymaker Hall	88.24	Edwards Hall	28.57	Goodnow Hall	54.55
arrell Library	32.26	Farrell Library	5.88	K-State Union	26.19	Farrell Library	11.36
-State Union	16.13	Seaton Hall	5.88	Farrell Library	14.29	K-State Union	11.36
tudent Recreation Center	3.23			Seaton Hall	11.90	Student Recreation Center	4.55
illard Hall	3.23			Ackert Hall	7.14	Seaton Hall	4.55
				Ward Hall	2.38	Greenhouses	4.54
				Veterinary Med. Building	2.38	Justin Hall	2.27
				Call Hall	2.38	Anderson Hall	2.27
				Weber Hall	2.38	Durland Hall	2.27
						East/West Stadium	2.27
=21		N=21		N=22		N=22	

The dormitory hall was the place most frequently used when the subjects were not in class. Places to socialize, relax and study such as the K-State Union, Farrell Library and the Student Recreation Center, were also mentioned. The students' major classroom building was also used when they were not in class. For example, Justin Hall is used by Home Economic students, Ackert Hall is used by Biology students, Seaton Hall is used by Architecture students, etc. Those buildings in which the student population most often gathers would render optimum effectiveness in the posting of important information. Thus, important information should be posted at the dormitory halls where most of the students spent most of their time when not in class.

The highest percentage of the campus drawn by a subject in this study was 85.9 percent. The lowest percentage was 17.1 percent. The mean for all campus elements drawn was 45.0 percent. This score is not high. It can possibly be explained by the fact that the Kansas State University campus is very large and spread out.

While interviewing the subjects for this study, the researcher noticed that cognitive maps were drawn in three ways. Some people drew in all the streets first, and then went back and added the buildings. Others drew the buildings, but completely ignored the streets. Still others drew all the streets and buildings in a certain section of campus before proceeding to sketch another part of the campus.

The subjects who drew the streets first seemed to experience more difficultly in sketching the campus. Most of these subjects misplaced street locations and then had to go back and make changes in order to complete the sketch. For example, one respondent drew Manhattan and Denison Avenue too close together. While drawing the buildings in between these streets he realized that there was not enough space available. He then erased Manhattan Avenue and moved it back in order to fit all the buildings he knew of between these two streets. The subjects who completed one section of the campus at a time (buildings and streets together) experienced the least difficulty in drawing a sketch of the campus. Sketches of the campus are shown in figure 2, 3, and 4.

Figure 2

An average map drawn of the Kansas State University campus. This subject drew all the streets and buildings in a certain section of campus before proceeding to sketch another part of the campus.

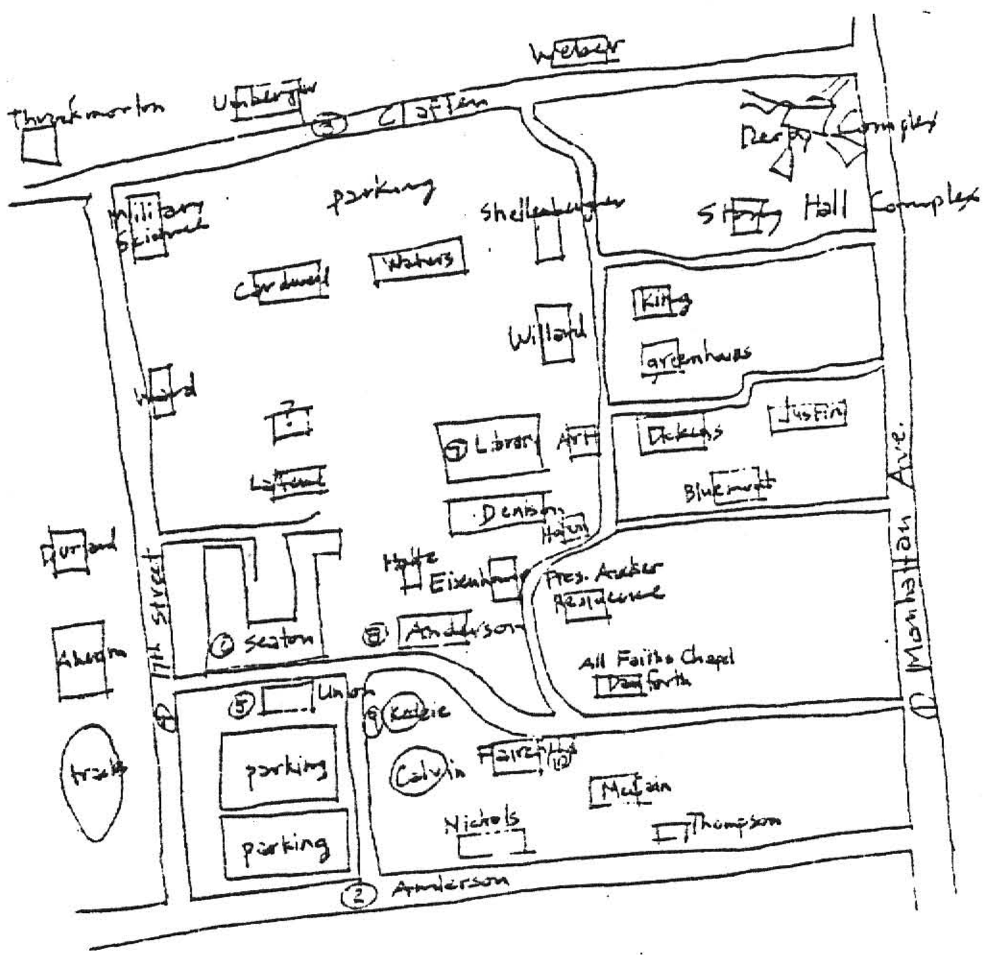


Figure 3

An above average map drawn of the Kansas State University campus. The subject started drawing his sketch from his major classroom building (Willard Hall).

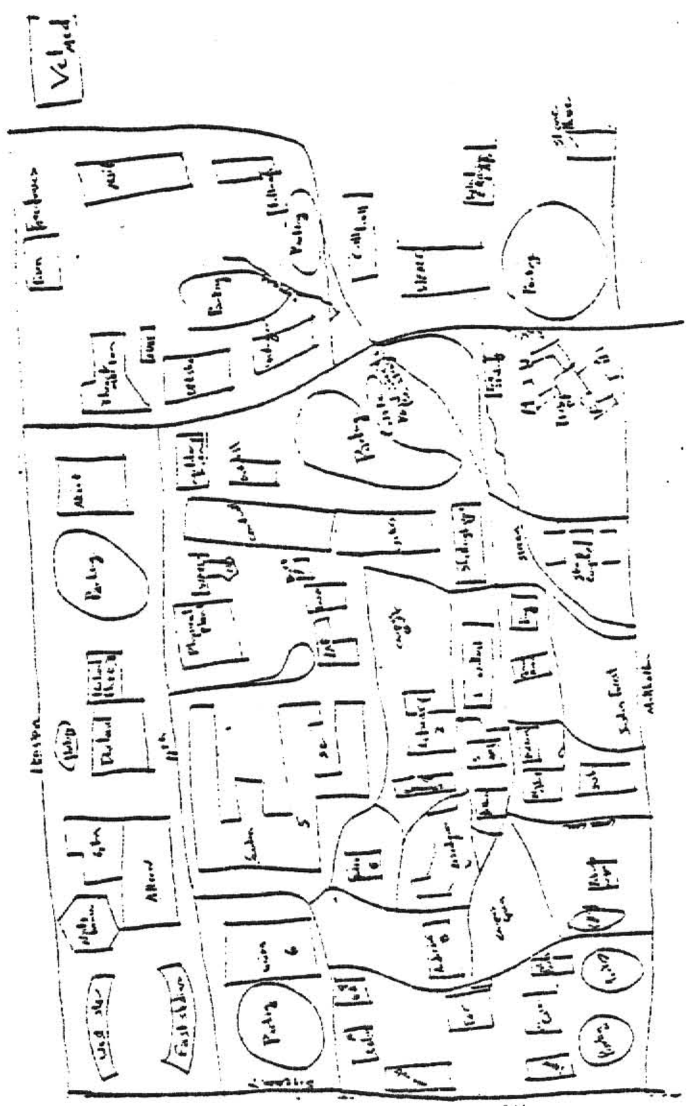
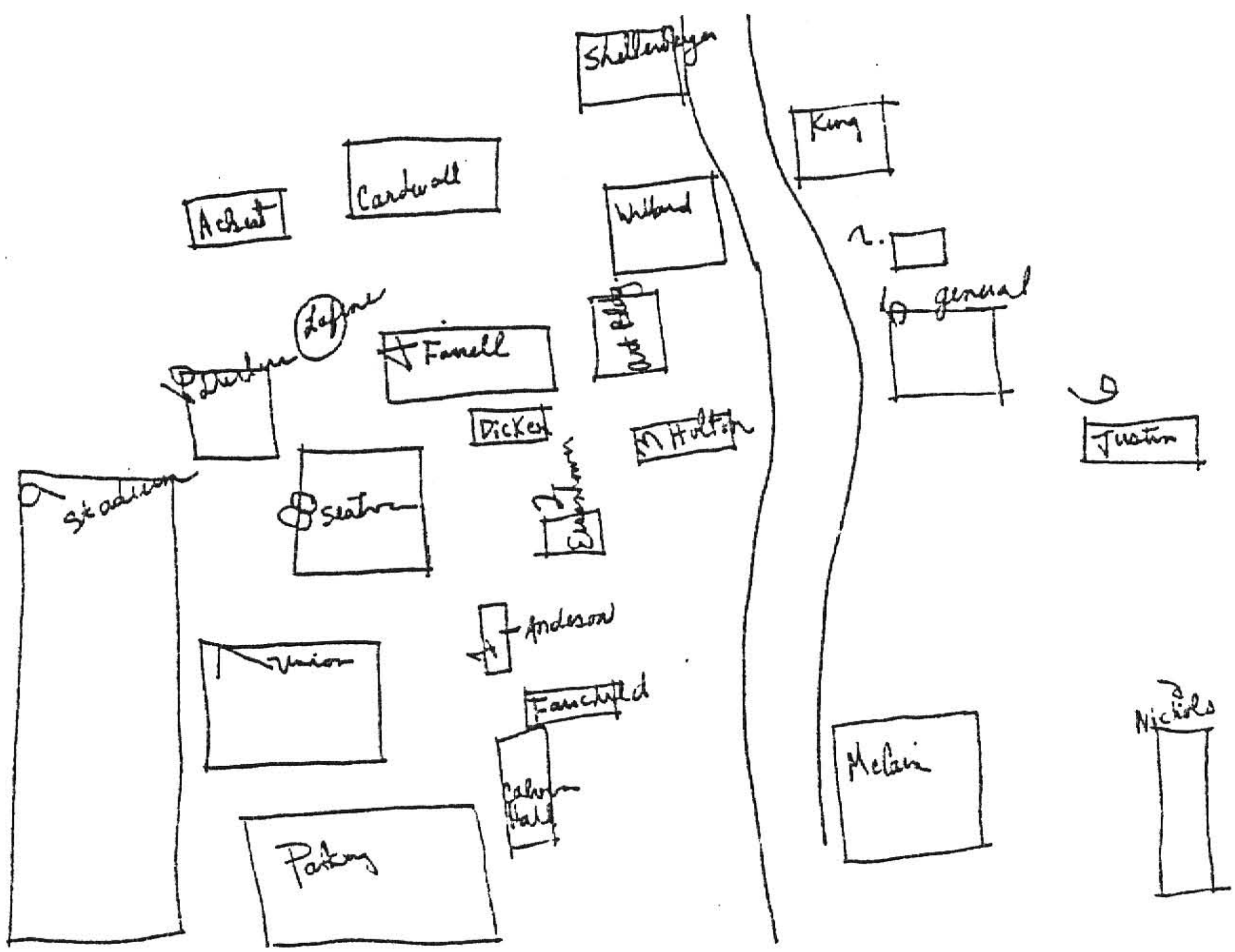


Figure 4

A below than average map of the Kansas State University campus. The subject drew the buildings, but completely ignored the streets.



The subjects started drawing at one of three reference points: 1) the dormitory hall, 2) the major classroom building, or 3) the center of the campus. Forty six percent of the subjects began drawing from their dormitory hall, 25 percent started their map at the center of campus, 17 percent drew the major classroom building first, and 12 percent started at other locations. People travel the same paths everyday and start drawing at that location which is easiest to picture and most significant.

Hypothesis 2

A graphic display of the percentage of campus elements drawn according to months of residence in Manhattan is shown in table 4. Because the PR > 0.0819, the null hypothesis was not rejected. This means that students living in Manhattan for longer periods of time could not recall any more campus elements or draw a more complete map than students living in Manhattan for shorter periods. Because of the small sample size (50-75 and 76+) the results may not be valid.

Table 4

Mean distribution of the percentage of the campus drawn by months living in Manhattan, Kansas.

MONTHS LIVING IN MANHATTAN	N	MEAN
0 - 25	57	41.02
26 - 50	24	53.47
51 - 75	3	55.22
76 +	2	55.22

PR >0.0819

Individual differences in perception of the campus may explain these results. Some people may be quicker to perceive and comprehend the campus environment than others. This may be why some students living in Manhattan for three months can recall and draw a higher percentage of campus elements than students who have lived in town for much longer periods of time. Those who have lived in Manhattan for a long time may not pay attention to the physical environment. The recalling of campus elements in order to draw a sketch is not affected by the length of residence in Manhattan. However, it may be affected by how observant the subject has been when interacting with the environment.

Hypothesis 3

The location of the dormitory on campus (northwest, east or west) did not affect the distortion rating of the subject's sketch of the campus. The distortion rating ($PR > 0.1053$, $F=2.10$) had a probability rating $> .05$, so the null hypothesis was not rejected. There was not a significant relationship between the number of campus elements distorted in a given sketch by dormitory location. However, the location of the dormitory on campus did affect the subject's mislocation rating of the sketch drawn of the campus. The mislocation rating ($PR > 0.0302$, $F=3.11$) had a probability $< .05$, so the null hypothesis was rejected. The placement of buildings, streets and nature areas on the sketch was affected by the subject's dormitory location. The closer the campus elements are located to the students dormitory hall, the lower the misplacement score. Thus, the farther away campus elements are from the students dormitory hall, the higher the misplacement score.

The mean distortion and mislocation ratings for all the subjects in this study was D=1.37 and M=1.19. The scale ranged from 1 to 3, with 1 being, "the campus elements not distorted or mislocated," 2 being "the campus elements somewhat distorted or mislocated," and 3 being "the campus elements very distorted or mislocated." A graphic display of the rank order of the percentage of campus elements drawn according to distortion and mislocation is shown in table 5 and 6.

The distortion rating for the first ten campus elements drawn had a mean of 1.86 and ($PR > 0.0002$, $\underline{F}=5.74$). The mislocation rating had a mean of 1.29 and ($PR > 0.0001$, $\underline{F}=15.00$). Because the probability was $< .05$, the null hypothesis was rejected. The first ten campus elements drawn on the sketch were more distorted and mislocated than other campus elements. This can be demonstrated by comparing the means of the first ten campus elements drawn to the distortion and mislocation means of all the campus elements drawn.

A tendency existed for the mapper to distort and mislocate the first ten campus elements drawn on the sketch. A distortion and mislocation error created early in the sketch of the first ten campus elements was compounded because the mapper was unwilling

Table 5

A graphic display of the rank order of the percentage of campus elements drawn according to distortion.

CAMPUS ELEMENTS	PERCENTAGE	CAMPUS ELEMENTS	PERCENTAGE
Stone Child Care Center	3.00	Throckmorton Hall	1.44
President's House	2.31	Washburn Intramual Complex	1.43
International Student Center	2.30	Marching Band Field	1.42
Thompson Hall	2.07	Leasure Hall	1.42
Umberger Hall	2.04	Creek	1.41
Grounds & Paint Shop	2.00	KSU Stadium	1.41
Bushnell Hall	2.00	Danforth & All-Faiths Chapel	1.40
Housing Maintenance Building	1.91	Kramer Food Center	1.39
Schellenberger Hall	1.90	Home Management Houses	1.38
Eisenhower Hall	1.90	Calvin Hall	1.38
Ahearn Field House	1.74	Pittman Building	1.37
Quinlin Natural Area	1.73	Greenhouses By Dickens Hall	1.37
Military Science Building	1.71	Dykstra Hall	1.36
Ward Hall	1.71	Open Space By Anderson Hall	1.35
McCain Hall	1.69	Holtz Hall	1.35
Justin Hall	1.67	Goodnow Hall	1.25
East/West Stadium	1.65	Marlatt Hall	1.19
Burt Hall	1.64	Parking Lot By Weber Hall	1.17
Trailers	1.62	Van Zile Hall	1.17
Bluemont Hall	1.60	Putnam Hall	1.16
Lafene Student Health Center	1.60	Derby Food Center	1.15
Waters Hall	1.59	Parking Lot Behind Weber Hall	1.11
Old Dairy Barn	1.58	Haymaker Hall	1.11
Veterinary Medical Complex	1.58	Ford Hall	1.10
Weber Hall	1.58	Parking Lot By Thompson Hall	1.08
Farrell Library	1.57	Oak Drive	1.07
Power Plant	1.57	Boyd Hall	1.07
Kedzie Hall	1.57	West Hall	1.06
Dickens Hall	1.55	Moore Hall	1.05
King Hall	1.55	Clafin Road	1.04
Cardwell Hall	1.54	Union Parking Lot	1.03
Nichols	1.54	Vattier Street	1.02
Holton Hall	1.52	Mid Campus Drive	1.01
Student Recreation Center	1.52	Manhattan Avenue	1.00
Jardine Terrace Apartments	1.52	Anderson Avenue	1.00
Anderson Hall	1.52	Denison Aveneue	1.00
Ackert Hall	1.51	17th Street	1.00
K-State Union	1.51	College Heights Road	1.00
Greenhouses By Throckmorton Hall	1.50	Lovers Lane	1.00
Call Hall	1.50	Campus Creek Road	1.00
Stadium Parking Lot	1.50	Petticoat Lane	1.00
Durland Hall	1.50	Mid Campus Sidewalk	1.00
Denison Hall	1.49	Sidewalk By Ackert Hall	1.00
Seaton Hall	1.49	Sidewalk By Veterinary Building	1.00
Art Building	1.48	Power Plant Smoke Stack	1.00
Edwards Hall	1.47	Fork Sculpture	1.00
Willard Hall	1.47	Parking Lot By East/West Stadium	1.00
Fairchild Hall	1.45	Parking Lot By Ackert Hall	1.00
Durland II (under construction)	1.45	Parking Lot By Call Hall	1.00
Hollis House	1.44		

Table 6

A graphic display of the rank order of the percentage of campus elements drawn according to mislocation.

CAMPUS ELEMENTS	PERCENTAGE	CAMPUS ELEMENTS	PERCENTAGE
Stone Child Care Center	1.80	Willard Hall	1.25
President's House	1.72	Stadium Parking Lot	1.25
Veterinary Medical Complex	1.71	Creek	1.25
Holtz Hall	1.71	Old Dairy Barn	1.25
Student Recreation Center	1.70	West Hall	1.25
Thompson Hall	1.70	Trailers	1.25
Holton Hall	1.68	Umberger Hall	1.24
Durland Hall	1.66	Moore Hall	1.24
Bushnell Hall	1.62	Hollis House	1.22
Durland II (under construction)	1.62	Calvin Hall	1.21
Ahearn Field House	1.61	Goodnow Hall	1.19
Justin Hall	1.60	Haymaker Hall	1.19
Burt Hall	1.58	Derby Food Center	1.18
Lafene Student Health Center	1.54	Dickens Hall	1.17
Art Building	1.52	Parking Lot By Call Hall	1.16
McCain Hall	1.52	Throckmorton Hall	1.15
East/West Stadium	1.51	Home Management Houses	1.15
Quinlin Natural Area	1.50	Marching Band Field	1.14
Eisenhower Hall	1.50	Parking Lot By Old Stadium	1.14
International Student Center	1.48	Power Plant	1.14
Pittman Building	1.48	Seaton Hall	1.13
King Hall	1.48	Petticoat Hall	1.12
Nichols	1.48	Cardwell Hall	1.12
KSU Stadium	1.47	Parking Lot By Ackert Hall	1.09
Edwards Hall	1.47	Waters Hall	1.09
Leasure Hall	1.46	Parking Lot By Thompson Hall	1.08
Kedzie Hall	1.46	Dykstra Hall	1.07
Washburn Intramual Complex	1.43	K-State Union	1.05
Anderson Hall	1.42	Vattier Street	1.04
Schellenberger Hall	1.41	Mid Campus Drive	1.03
Fairchild Hall	1.40	College Heights Road	1.02
Military Science Building	1.38	17th Street	1.02
Ward Hall	1.37	Clafin Road	1.01
Danforth & All-Faiths Chapel	1.37	Greenhouses By Dickens Hall	1.00
Housing Maintenance Building	1.36	Grounds & Paint Shop	1.00
Van Zile Hall	1.35	Anderson Avenue	1.00
Marlatt Hall	1.34	Manhattan Avenue	1.00
Farrell Library	1.34	Denison Avenue	1.00
Greenhouses By Throckmorton Hall	1.33	Oak Drive	1.00
Weber Hall	1.33	Lovers Lane	1.00
Putnam Hall	1.33	Mid Campus Drive	1.00
Campus Creek Road	1.31	Sidewalk By Ackert Hall	1.00
Jardine Terrace Apartments	1.30	Sidewalk By Veterinary Building	1.00
Boyd Hall	1.29	Power Plant Smoke Stack	1.00
Bluemont Hall	1.29	Fork Sculpture	1.00
Ford Hall	1.28	Open Space By Anderson Hall	1.00
Denison Hall	1.28	Union Parking Lot	1.00
Kramer Food Center	1.28	Parking Lot Behind Waters Hall	1.00
Ackert Hall	1.28	Parking Lot By Weber Hall	1.00
Call Hall	1.26		

to sacrifice the work performed prior to the discovery of the error. For example, people start drawing a sketch of the campus at different locations on the paper. The first ten campus elements (mostly buildings) are drawn larger than actual size on the sketch. As more of the campus is drawn, the campus elements begin to get smaller. Also, as the sketch gets closer to the edge of the paper, the campus elements drawn get smaller. The same type of error occurred for the subjects misplacement of campus elements. Misplacement of campus buildings, nature areas and streets created in the first ten campus elements drawn in the sketch was compounded because the mapper was unwilling to sacrifice the work performed prior to the discovery of the error.

The distance of the elements from the dormitory (close, medium or far) did not affect the distortion rating ($PR > 0.3419$, $\underline{F}=1.14$) of the subject's sketch. A graphic display of the mean distribution of distortion and mislocation rating for the campus elements by distance (close, medium or far) is shown in table 7. Regardless of the elements' distance from the dormitory, the subjects seemed to have a consistently good understanding of building, street and nature area size. These results are similar to those of Appleyard (1976) and Lynch (1960), who found that the elements people recalled most were the sharpness of a boundary or street and the size and shape of buildings.

Table 7

Mean distribution of distortion and mislocation rating for the campus elements by distance (close, medium or far).

DISTANCE	N	DISTORTION	MISLOCATION
Far	1648	2.06	1.37
Medium	1357	1.85	1.26
Close	868	1.45	1.17
		PR > 0.3419	PR > 0.0001

The distance of the campus elements from the dormitory (close, medium or far) did affect the mislocation rating (PR > 0.0001, $\underline{F}$=9.91) of the subject's sketch of the campus. A graphic display of the mean distribution of distortion and mislocation rating for the campus elements by distance (close, medium or far) is shown in table 7. Because the probability is < .05, the null hypothesis was rejected. The farther the distance the student travels from his dormitory, the more mislocated the campus elements become. Also, the closer the campus elements are located to the students dormitory hall, the lower the misplacement score.

Hypothesis 4

If the probability for each independent variable (sex, age, education, urban/rural background, college major and income) was < .05, the null hypothesis was rejected by the data. This means there is a significant relationship between the percentage of the campus drawn and the independent variables used in this study. In other words, the dependent variable (the percentage of the campus drawn by the subject) was caused by one or more of the independent variables. According to the theoretical framework, a probability $>.05$ would have meant that the null hypothesis was not rejected. In other words, a relationship was not found between the percentage of the campus drawn and the independent variable.

For the independent variables of sex ($PR > 0.3837$, $F=0.77$), age ($PR > 0.1650$, $F=1.46$), income ($PR > 0.7255$, $F=0.51$), and urban/rural background ($PR > 0.6560$, $F=0.69$), the null hypothesis was not rejected. These variables did not influence the percentage of the campus drawn by the subject.

For the independent variables of subject's means of transportation around campus ($PR > 0.0039$, $F=5.93$) and his education level ($PR > 0.0218$, $F=3.04$), the null hypothesis was rejected. These variables influence the percentage of the campus drawn.

The subject's means of transporting himself around campus influences his ability to recall campus elements. For example, one can travel longer distances by bicycle or automobile than by walking. Subjects walking around campus are limited in the distance they can travel due to lack of transportation. People traveling by automobile may have to go out of their way due to limited road accessibility, thus enlarging their knowledge of the campus environment. But it a person has to walk, he is more familiar with those campus elements which might not be visible from roads. These results are similar to those of Orleans (1973) and Goodchild (1974), who found that people perceive the environment differently according to their mode of transportation. Those who drive an automobile or bicycle around campus can recall more campus elements than those who walk.

Familiarity with campus areas has different effects on user perception. Juniors and seniors who are more familiar with the campus environment recall more when drawing their sketches. They have taken classes in many different buildings, so they have a better knowledge of the campus environment than freshman and sophomores. It was found that people with different educational levels (freshman, sophomore, junior, senior and graduate student) display different cognitive images as a function of their experience and familiarity with the campus. These results are similar to those of Saarinen (1964), who found that people display different cognitive images as a function of their experience with the Chicago Loop.

For the independent variables of age (Distortion: $PR > 0.1675$, $\underline{F}=1.44$; Mislocation: $PR > 0.0802$, $\underline{F}=1.72$), education level (Distortion: $PR > 0.2739$, $\underline{F}=1.31$; Mislocation: $PR > 0.4662$, $\underline{F}=0.90$), urban/rural background (Distortion: $PR > 0.2684$, $\underline{F}=0.49$; Mislocation: $PR > 0.7083$, $\underline{F}=2.34$), income (Distortion: $PR > 0.3172$, $\underline{F}=0.49$; Mislocation: $PR > 0.7983$, $\underline{F}=0.50$) and college major (Mislocation: $PR > 0.5149$, $\underline{F}=0.98$), the null hypothesis was not rejected. These variables did not influence the subjects' distortion or mislocation ratings of the sketches drawn.

For the independent variables of sex (Distortion: PR > 0.0550, F=3.79; Mislocation: PR > 0.0134, F=6.39), means of transportation around campus (Distortion: PR > 0.0001, F=32.44; Mislocation: PR > 0.0037, F=5.98) and college major (Distortion: PR > 0.0001, F=8.79), the null hypothesis was rejected. These variables influence the subjects' distortion and mislocation ratings of the sketches drawn.

Table 8

Mean distribution of the distortion and mislocation rating for the campus drawn by sex.

GENDER	N	DISTORTION	MISLOCATION
Male	44	1.62	1.25
Female	42	2.14	1.33
		PR >0.0550	PR >0.0134

In this study females drew slightly more distorted and mislocated campus maps than males. A mean distribution of the distortion and mislocation rating for the campus drawn by sex is shown in table 8. When specialized tests have not been deliberately standardized to remove sex differences, there is some suggestion that males may do a little better on quantitative items, and females a little better on verbal items. These are not large differences, however, and they are not consistently reported in all studies. The most consistently found sex difference-at least after early childhood-is on tasks involving spatial visualization, on which males tend to do better. There has been much effort spent in an attempt to show that this difference is due to a single, sex-linked, recessive gene. The early studies that seemed to show this genetic link have not been successfully repeated (Loehlin et. al., 1978; DeFries et. al., 1979). We do not know to what extent real sex differences in spatial abilities is genetic, and to what extent it is cultural.

Table 9

Mean distribution of the distortion and mislocation rating for the campus drawn by how the subject commutes around campus.

TRANSPORTATION	N	DISTORTION	MISLOCATION
Bicycle	2	1.79	1.12
Automobile	7	1.72	1.43
Walk	77	1.43	1.28
		PR >0.0001	PR >0.0037

Those who drive an automobile or bicycle around campus drew slightly more distorted and mislocated campus maps than those who walk. A mean distribution of the distortion and mislocation rating for the campus drawn by how the subject commutes around campus is shown in table 9. If a person has to walk, he is more familiar with those campus elements which might not be visible from roads. Also, one travels through the campus environment faster by bicycle or automobile, and cannot observe and comprehend the environment as well as an individual who walks.

Because the subject was more familiar with his classroom building used for his college major, he had a tendency to distort these elements. A person who uses these buildings everyday or several times a week is more familiar with them, and thus will distort them.

SUMMARY OF FINDINGS

In spite of subjective differences, there were many regularities among individual images for the Kansas State University campus. Without this common image, orderly movement within the campus would be impossible. However, in the present study, the landscaping was not frequently mentioned. A possible explanation of this may be that the landscaping on campus is a subtle design feature. Perhaps the subjects interviewed didn't place a societal emphasis on nature and ecology or maybe they took the landscaping on campus for granted. These results are similar to those of Appleyard (1976) and Lynch (1960), who found that the elements people recalled most were the contour (the sharpness of a boundary or street) and the size and shape of buildings.

Cognitive maps of the campus were drawn in three ways. Some people drew in all the streets first, and then went back and added the buildings. Others drew the buildings, but completely ignored the streets. Still other subjects completed one section of the campus at a time (buildings and streets together).

The subjects who drew the streets first seemed to experience more difficulty in sketching the campus. Most of these subjects misplaced street locations and then had to go back and make changes in order to complete the sketch. The subjects who drew all the streets and buildings in a certain section of campus before proceeding to sketch another part of the campus experienced the least difficulty in drawing the sketch.

The subjects started drawing at one of three reference points: 1) the dormitory hall, 2) the major classroom building, or 3) the center of the campus. People travel the same paths everyday and start drawing at that location which is easiest to picture and most significant.

Students living in Manhattan, Kansas for longer periods of time could not recall any more campus elements or draw a more complete map than students living in town for shorter periods. Individual differences in perception of the campus may explain these results. Some people may be quicker to perceive and comprehend the campus environment than others. This may be why some students living in Manhattan for three months can recall and draw a higher percentage of campus elements than students who have lived in town for much longer periods of time. Those who have lived in Manhattan for a long time may not pay attention to the physical environment. The recalling of campus elements in order to draw a sketch is not affected by the length of residence in Manhattan. However, it may be affected by how observant the subject has been when interacting with the environment.

A tendency existed for the mapper to distort and mislocate the first ten campus elements drawn on the sketch. A distortion and mislocation error created early in the sketch of the first ten campus elements was compounded because the mapper was unwilling to sacrifice the work performed prior to the discovery of the error. People start drawing a sketch of the campus at different locations on the paper. The first ten campus elements (mostly buildings) are drawn larger than actual size on the sketch. As more of the campus is drawn, the campus elements begin to get smaller. Also, as the sketch gets closer to the edge of the paper, the campus elements drawn get smaller. The same type of error occurred for the subjects misplacement of campus elements.

The distance of the campus elements from the dormitory (close, medium or far) did affect the mislocation rating of the subject's sketch of the campus. The closer the campus elements are located to the students dormitory hall, the lower the misplacement score. Thus, the farther awary campus elements are from the students dormitory hall, the higher the misplacement score.

The subject's means of transporting himself around campus influences his ability to recall campus elements. Those people who drive an automobile or bicycle around campus can recall more campus elements than those who walk. Those who drive an automobile or bicycle around campus drew slightly more distorted and mislocated campus maps than those who walk. Because one travels through the campus environment faster by bicycle or automobile, one cannot observe and comprend the environment as well as an individual who walks.

Juniors and seniors who are more familiar with the campus environment recall more when drawing their sketches. They have taken classes in many different buildings, so they have a better knowledge of the campus environment than freshman and sophomores. It was found that people with different education levels display different cognitive images as a function of their experience and familiarity with the campus.

In this study females drew slightly more distorted and mislocated campus maps than males. The most consistently found sex difference-at least after early childhood-is on tasks involving spatial visualization, on which males tend to do better. There has been much effort spent in an attempt to show that this difference is due to a single, sex-linked, recessive gene. The early studies that seemed to show this genetic link have not been successfully repeated. We do not know to what extent real sex differences in spatial abilities is genetic, and to what extent it is cultural.

CHAPTER 4

LIMITATIONS

This study was limited in several ways. To begin with, the sample was small. Only 86 people were interviewed. The sample size resulted from the method of inquiry, which required lengthy interviews and extensive analysis.

The researcher depended on individual, hand-drawn sketch maps to indicate the cognitive processes involved in the perception of the campus environment. However, a fundamental question remains: Are hand-drawn sketches a good representation of the existing campus environment?

Each respondent's sketch was compared to an existing map of the campus and then analyzed for distortion and mislocation to determine the accuracy of the respondent's image. This involved a subjective measurement used by the researcher. There was no objective way to measure the distortion of physical characteristics drawn in each individual's sketch. Because each subject drew his cognitive map a different size, an objective measurement of distortion could not be performed. The researcher determined the rate of distortion of each building drawn by comparing it to the size of surrounding buildings. The mislocation ratings of each building, street or other physical characteristic were more objective. The researcher compared each building and street location on the respondent's sketch to a correct map of the campus. Any building or street out of place was rated for mislocation.

In this study, a tendency existed for the mapper to accumulate and exaggerate errors. For example, an error created early in the sketch was compounded because the mapper was unwilling to sacrifice the work performed prior to the discovery of the error. The researcher tried to reduce this problem by giving the subject an eraser to correct any mistakes made while drawing the sketch. Another method used to reduce this problem was to have subjects build their maps on several surfaces (e. g., creating a base map in the form of a sketch and then overlaying the attributes on a sheet of tracing paper). In this way, more responsive evaluative expressions were included by the subject.

The data for the present study were obtained in a manner similar to that of Lynch (1960), although the schema was somewhat modified to overcome the weaknesses of Lynch's study. For example, a data analysis was performed to see if the sketch was a valid representation of the existing campus. Object placement and accuracy in the drawing of campus elements were determined.

This study's most significant finding is that an individual's perceptual and cognitive behavior can be predicted by techniques readily available to designers and planners.

IMPLICATIONS FOR FUTURE RESEARCH AND ACTION

An assessment of a built environment should be conducted by architects and planners to determine improvements in design. Regardless of whether such assessments focus on urban neighborhoods, buildings or campus design, they should provide useful information to architects as well as those involved in public policy decisions. The key is to design the built environment with human beings in mind. Decisions are made everyday on issues dealing with the built environment without benefit of access to information on man-environment interactions. The quality of these decisions could be improved by supplying better information about how people perceive and react to their environment.

Insufficient attention has been given to the impact of the physical components of settings on environmental cognition (Wohwill, 1976). Existing research has focused primarily on environmental structure and landmarks. Planners have stressed the importance of city structure in environmental cognition, with emphasis on regular, well-defined path systems (Appleyard, 1976; Lynch, 1960). Researchers have ignored the potential influence of social meaning and symbolism in environmental cognition. Although more difficult to measure, vital comprehension must also be achieved concerning the individual's need for stability, security, comfort and adaptation in the built environment.

Future research needs to be done to see if a more visually interesting environment would increase the availability of symbolic information, compared to a less visually interesting environment. Would exciting design incorporating novelty, complexity, color, variation and noticeable differences make the built environment more memorable and easier to perceive and comprehend.

What makes people start drawing their cognitive map at a specific location, is it caused by familiarity with that location or by another variable. Why do some people draw buildings in the sketch, but completely ignore the streets. While others draw the streets first, and then go back and add the buildings. These individual differences in drawing a cognitive map should be investigated in future research.

A final issue requiring further investigation deals with how a person translates experience in other built environments to the imaging of a built environment new to him. For example, when a person visits a new shopping mall, he has preconceived expectations concerning what will occur and how the built environment will look. How does the researcher separate past experience from present anticipations in such a case. It is a question worthy of research.

APPENDIX

Table 10

Mean distribution of the percentage of the campus drawn by sex.

GENDER	N	MEAN
Male	44	46.56
Female	42	43.41

PR >0.3837

Table 11

Mean distribution of the percentage of the campus drawn by age.

AGE	N	MEAN
31	1	62.60
22	13	56.88
33	1	55.50
30	1	53.50
28	1	51.50
20	16	47.98
26	2	44.95
21	11	44.85
19	17	43.08
24	2	37.85
23	7	37.24
18	13	35.55
25	1	27.30

PR >0.1605

Table 12

Mean distribution of the percentage of the campus drawn by year in school.

YEAR IN SCHOOL	N	MEAN
Senior	22	50.56
Junior	21	50.00
Graduate	9	45.33
Sophomore	11	42.88
Freshman	23	36.08

PR >0.0218

Table 13

Mean distribution of the percentage of the campus drawn by major.

COLLEGE MAJOR	N	MEAN
Education	4	58.40
Arts & Science	22	46.89
Home economics	9	46.58
Agriculture	10	46.14
Architecture	12	42.33
Engineer	15	42.31
Business Admin.	14	41.66

PR >0.6560

Table 14

Mean distribution of the percentage of the campus drawn by how the subject commutes around campus.

TRANSPORTATION	N	MEAN
Bicycle	2	82.85
Automobile	7	46.00
Walk	77	43.94

PR >0.0039

Table 15

Mean distribution of the percentage of the campus drawn by urban/rural background.

URBAN/RURAL BACKGROUND	N	MEAN
Large Metropolitan Area (500,000 +)	18	47.88
Medium Sized Town (25,000-49,999)	10	46.15
Small Town (500-24,999)	25	45.34
Rural Area (less than 499 people)	13	44.63
City (50,000-499,999)	20	41.74

PR >0.8560

Table 16

Mean distribution of the distortion and mislocation rating for the campus drawn by how the subject commutes around campus.

TRANSPORTATION	N	DISTORTION	MISLOCATION
Bicycle	2	1.79	1.12
Automobile	7	1.72	1.43
Walk	77	1.43	1.28
		PR >0.0001	PR >0.0037

Table 17

Mean distirbution of the percentage of the campus drawn by income.

INCOME	N	MEAN
$15,000-19,999	1	56.60
$5,000-9,999	9	50.71
$1,000-4,999	52	44.99
Less than $999	22	42.57
$10,000-14,999	2	41.35

PR>0.7258

Table 18

Mean distribution of the distortion and mislocation rating for the campus drawn by urban/rural background.

URBAN/RURAL BACKGROUND	N	DISTORTION	MISLOCATION
Large Metropolitan Area (500,000 +)	18	1.71	1.36
Small Town (500-24,999)	25	2.09	1.28
Medium Sized Town (25,000-49,999)	10	2.45	1.28
City (50,000-499,999)	20	1.70	1.27
Rural Area (less than 499 people)	13	1.42	1.20
		PR >0.2684	PR >0.0619

Table 19

Mean distribution of the distortion and mislocation rating for the campus drawn by age.

AGE	N	DISTORTION	MISLOCATION
22	13	2.89	1.22
19	17	2.03	1.27
21	11	1.84	1.36
24	2	1.64	1.66
26	2	1.51	1.40
18	13	1.47	1.31
28	1	1.47	1.37
20	16	1.40	1.27
23	7	1.39	1.28
25	1	1.37	1.14
33	1	1.35	1.33
30	1	1.32	1.20
31	1	1.27	1.22
		PR > 0.1675	PR > 0.0802

Table 20

Mean distribution of the distortion and mislocation rating for the campus drawn by year in school.

YEAR IN SCHOOL	N	DISTORTION	MISLOCATION
Senior	22	2.13	1.28
Graduate	9	2.13	1.35
Junior	21	2.10	1.26
Sophomore	11	1.45	1.34
Freshman	23	1.43	1.28
		PR > 0.2739	PR > 0.4662

Table 21

Mean distribution of the distortion and mislocation rating for the campus drawn by college major.

COLLEGE MAJOR	N	DISTORTION	MISLOCATION
Education	4	1.56	1.35
Arts & Sciences	22	1.85	1.42
Home Economics	9	1.56	1.33
Agriculture	10	1.53	1.26
Architecture	12	1.36	1.27
Engineers	15	1.39	1.28
Business Admin.	14	1.41	1.31
		PR > 0.0001	PR > 0.5149

QUESTIONNAIRE

I am a graduate student in architecture (emphasis environment behavior) studying how students perceive and understand the Kansas State University campus. To assure your anonymity please do not write your name on the questionnaire. If you have any doubts about the meaning of any of the questions in this survey, please feel free to ask for assistance.

1. (Skip to question #2)
   Now look at the sketch you have just drawn which is your first impression. Do you have anything you would like to add or any parts of the sketch you would reduce? For example, you may have omitted something or misplaced a building.

2. In a moment you will be asked to draw a quick map of the Kansas State University campus. Draw it just if you are making a rapid description of the campus to a stranger, covering all the main features. Please talk outloud about what you are drawing. Also label all the elements that you know while drawing the map. (Interviewer takes notes on the sequence of the first ten elements drawn on the sketch. Skip back to question #1 before continuing the survey).

3. In what building(s) are most of your classes held in?

4. Where do you spend most of your time in a building or area on campus when not in class?

DEMOGRAPHY

I would like to ask you a few background questions about yourself if you don't mind.

5. Location of interview ______________________

6. College major ____________________

7. Sex: ☐ Male ☐ Female

8. How old are you? _____ years

9. What year of school are you in?

☐ Freshman
☐ Sophomore
☐ Junior
☐ Senior
☐ Graduate student

10. How long have you lived in Manhattan, Kansas? _____years _____ months

11. Where did you live most of the time while growing up?

☐ Rural area (less than 499 people)
☐ Small town (500-24,999)
☐ Medium sized town (25,000-49,999)
☐ City (50,000-499,999)
☐ Large metropolitan area (500,000 +)

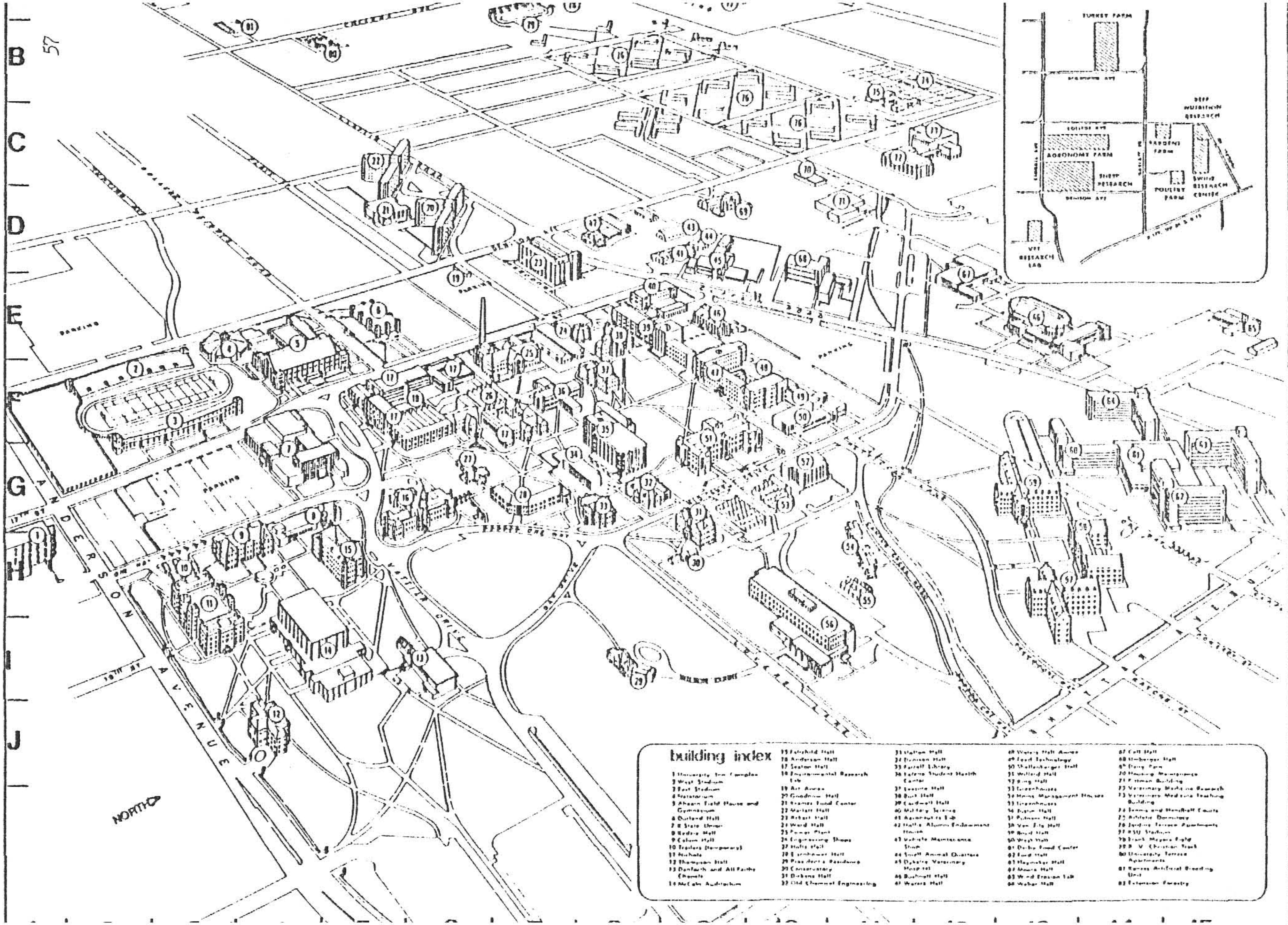
12. How do you usually commute around campus?

- [ ] Car
- [ ] Bicycle
- [ ] Motorcycle
- [ ] Walk
- [ ] Other ______________
  Specify

13. Could you please check the box that shows your total income for 1981 before taxes?

- [ ] Less than $999
- [ ] $1,000-4,999
- [ ] $5,000-9,999
- [ ] $10,000-14,999
- [ ] $15,000-19,999
- [ ] $20,000-24,999
- [ ] $25,000 +

This concludes the interview. I would now be happy to answer any questions you may have concerning the interview or the project.


B
C
D
E
F
G
H
I
J
ANDERSON AVENUE
17TH ST
NORTH
PARKING
TURKEY FARM
AGRONOMY FARM
SHEEP RESEARCH
POULTRY FARM
SWINE RESEARCH CENTER
BEEF NUTRITION RESEARCH
VET RESEARCH LAB
COLLEGE AVE
DENISON AVE
building index
1 University Inn Complex
2 West Stadium
3 East Stadium
4 Natatorium
5 Ahearn Field House and Gymnasium
6 Durland Hall
7 K State Union
8 Kedzie Hall
9 Calvin Hall
10 Trailers (temporary)
11 Nichols
12 Thompson Hall
13 Danforth and All Faiths Chapels
14 McCain Auditorium
15 Fairchild Hall
16 Anderson Hall
17 Seaton Hall
18 Environmental Research Lab
19 Art Annex
20 Goodnow Hall
21 Kramer Food Center
22 Marlatt Hall
23 Ackert Hall
24 Ward Hall
25 Power Plant
26 Engineering Shops
27 Holtz Hall
28 Eisenhower Hall
29 President's Residence
30 Conservatory
31 Dickens Hall
32 Old Chemical Engineering
33 Holton Hall
34 Denison Hall
35 Farrell Library
36 Lafene Student Health Center
37 Leasure Hall
38 Burt Hall
39 Cardwell Hall
40 Military Science
41 Aeronautics Lab
42 Hollis Alumni Endowment House
43 Vehicle Maintenance Shop
44 Small Animal Quarters
45 Dykstra Veterinary Hospital
46 Bushnell Hall
47 Waters Hall
48 Waters Hall Annex
49 Food Technology
50 Shellenberger Hall
51 Willard Hall
52 King Hall
53 Greenhouses
54 Home Management Houses
55 Greenhouses
56 Justin Hall
57 Putnam Hall
58 Van Zile Hall
59 Boyd Hall
60 West Hall
61 Derby Food Center
62 Ford Hall
63 Haymaker Hall
64 Moore Hall
65 Wind Erosion Lab
66 Weber Hall
67 Call Hall
68 Umberger Hall
69 Dairy Farm
70 Housing Maintenance
71 Pittman Building
72 Veterinary Medicine Research
73 Veterinary Medicine Teaching Building
74 Tennis and Handball Courts
75 Athletic Dormitory
76 Jardine Terrace Apartments
77 KSU Stadium
78 Frank Meyers Field
79 R. V. Christian Track
80 University Terrace Apartments
81 Kansas Artificial Breeding Unit
82 Extension Forestry

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DEVELOPMENT OF A CAMPUS IMAGE: A STUDY IN CAMPUS PERCEPTION AND LEGIBILITY

by

CRAIG MARC FRIEDMAN

B.S. Pennsylvania State University, 1980

AN ABSTRACT OF A MASTER'S THESIS

Submitted in partial fulfillment of the

requirements of the degree

MASTER OF ARCHITECTURE

Department of Architecture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1982

ABSTRACT

This study has revealed useful insights leading to a better understanding of the campus environment by concentrating on students' perception of the campus, as manifest in their preferences and legibility. How do students form impressions of the campus? Can this process be understood well enough for designers to predict the psychological effects of their work? This thesis has addressed these questions by determining how an individual's cognitive representation of the campus is related to his patterns of looking, and how these patterns inturn are related to the form of the campus.

A questionnaire was developed to measure cognitive judgments of the campus in general, as well as past experience and the personal characteristics of the study's subjects. The survey was designed to investigate the relationship between campus physical characteristics and such things as familiarity, personal characteristics (such as perceptual style) and legibility. The relationship among these variable domains were then examined. To test the influences of group differences, 86 students were interviewed. Respondents were chosen by a random sampling technique to increase the validity of the study.

In spite of subjective differences, there were many regularities among individual images for the Kansas State University campus. Without this common image, orderly movement within the campus would be impossible. The physical characteristics of the campus most frequently recalled by all the respondents were Cardwell Hall, Seaton Hall, K-State Union, Farrell Library, Clafin Road, Waters Hall and Mid Campus Drive. The physical characteristics of the campus most recalled by all the respondents were the contour (the sharpness of a boundary or street) and the size and shape of buildings. It was also found that students living in Manhattan for longer periods of time could not recall any more campus elements or draw a more complete map than students living in Manhattan for shorter periods. Finally, the personal characteristics of gender, first ten campus elements drawn on the sketch, the subject's means of transportating himself around campus, and education did not affect their percentage of the campus drawn, distortion and mislocation rating.

Directions for future research are discussed, as are the potential applications of environmental cognition work to architecture and planning.