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Mapping the image: A geographic study of image and space

Steven R. Holloway
The University of Montana

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MAPPING THE IMAGE:
A GEOGRAPHIC STUDY OF IMAGE AND SPACE

BY
STEVEN R. HOLLOWAY
B.A., STATE UNIVERSITY OF NEW YORK
COLLEGE AT NEW PALTZ, 1984

PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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DATE
The purpose of this thesis is to develop methodology for a geographic study of the behavioral environment: a psycho-physical space where the geographic, contextual and personal environments are organized. The methodology is designed to examine the space and image of the environment as a gestalt, and to test the hypotheses that: 1) the behavioral environment will favor a certain direction(s), 2) the affects approach—like will be associated with a core area and the affects avoid—dislike with an empty-space; a region opposite the bias direction(s), and 3) geographic space will be distorted in relation to the core area.

As a first step, the concept of the behavioral environment, the image, and other pertinent concepts are discussed. After surveying existing literature, three tests are developed to test the hypotheses. The three methods, developed from standard controlled association, multidimensional scaling and semantic differential tests, are used to map the space and image of the behavioral environment. A test is conducted on a sample of sixteen individuals who share a common neighborhood in Missoula, MT.

The first test elicits the contents of the behavioral environment by asking individuals to list "the place or places with which you live with on a more or less daily and weekly basis." The second test examines how geographic space is distorted. The third test determines which areas are disliked or avoided, and which are liked or approached.

Three types of spatial organization are indicated by the results, supporting the first hypothesis. In all cases information decays with distance from a core area. Type I, by far the most common type, is biased in one direction, Type II is biased along an axis, and Type III shows no apparent bias. An empty-space region appears opposite the bias direction(s), and is associated with the affects avoid—dislike while the core area is associated with the affects approach—like. Geographic space in the core tends to be expanded away from the center, while in the empty-space tends to be contracted and moved towards the core. Each of the hypotheses are supported by the test results.
Acknowledgments

I would like to thank those who have lent support during the course of this thesis. Special thanks go to the muses Aoede, Melete, and Mneme, to my wife Judith, and to Professors Paul Wilson, Chris Field, Tom Foor, and Jo Margaret Mano.
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Chapter 1

INTRODUCTION

Epidaurus is merely a place symbol: the real place is within the heart, in every man’s heart, if he will but stop and search for it. Every discovery is mysterious in that it reveals what is so unexpectedly immediate, so close, so long and intimately known.¹

Henry Miller

The real place is within the heart

Let me begin this paper by describing to you what comes to my mind when I think about the place where I am working on this paper.

I like my office. It is full of creative things. I have paints, color charts, an easel, papers, pencils, music, books, and maps. I rent a small office in a building that, somewhat to my embarrassment as a geographer, is in the flood plain of the Clark Fork River. My office faces north and west. From the north windows I can see the Clark Fork and the southern end of the Mission mountains. The north light is why I moved here. I make maps and design prints. I think at times of Meriwether Lewis crossing the river near Council Grove and camping, just across from me now, where Rattlesnake Creek enters the river. I have plans to hike into the Mission Mountains when this paper is completed. I can also see the muddy parking lot, the levees along the river built by the Army Corps of Engineers (which make me angry because I would like to see the river flood), houses, Higgins Bridge, the Wilma Building and downtown Missoula where I get my mail. Fourth Street ends in front of my building. Just west of here it crosses Higgins Street where there is a small business community that I frequent. One of the women who completed my surveys for this study, Number #36 as she likes to call herself, lives in an apartment across the river. An irrigation ditch passes behind the office. Up the embankment from the ditch is a garage where I have some things stored. Runners and bikers pass occasionally along the river path, that used to be the old Milwaukee Railroad, electrified around the turn of the century as a result of fires in Idaho. West I look out over many grave monuments as my neighbor is in the business of engraving these. Hellgate High School has a running track just to the east of here. My immediate neighbors in the building I can hear; they run a printing business.

My time is up. Do you have some idea of the place where I am working on this paper? What is this place I have described? Is this place a personal place, or is it a physical or geographic place? Perhaps the former tenant would have provided a different description,

omitting some features while adding others. My free flowing description was not premeditated, nor was it designed to inform you, the reader, of anything in specific. I wrote a description of what came to my mind when I thought of the place where I work: my office on East 4th Street in Missoula, Montana. I sought to provide a spontaneous description of this place. Just as places can be mapped a map can be made from my description.

My description, and others like it, will be the basis for much of the discussion and analysis in this paper. Map 1-1, appropriate in scale to locate all but two of the places I mentioned, shows the locations of the spatial elements to be found in my description. These elements are a part of the information field I provided in describing my environment. The term information field is used to refer to the mental information that an individual has about a specific set of elements. Each dot in Map 1-1 shows the location of a spatial element. The circle indicates an arbitrary boundary within which most of the places are located. A base map was used to locate the information field in geographic space. It has not been shown here because an attempt is been made to simplify the situation for the example. Maps in later chapters show appropriate base maps.

In the broadest sense this paper is about mental or cognitive maps, "those spatial images which people have of the physical environment and which primarily affect spatial

---

2The information in this thesis is digitized at a scale of 1:24000 and displayed on base maps at 1:225,000.

behavior." The map constructed from the description of my work place can be considered

4 Amos Rapoport, Human Aspects of Urban Form, (New York: Pergamon Press, 1977), p.119. "Such representations of the environment are called by different names, such as "cognitive maps" or "spatial representations," but my favorite is the simple phrase "mental maps." This term should be interpreted very metaphorically, however, since the way people normally represent environments to
a mental map. "Cognitive mapping is a process composed of a series of psychological
transformations through which an individual acquires, codes, stores, recalls, and decodes
information about the relative locations and attributes of phenomena in his everyday spatial
environment."5

Traditionally mental maps have been drawn by the subject, but there is nothing
prohibiting a "mental map" from being constructed from a description. For the purposes of
this study the term mental or cognitive map is used to refer to the spatial images which
people have of their environment(s). Sketch maps are also considered to be kinds of mental
maps. Make a simple sketch map of your home or work space.

The resulting picture will tell you a lot about your mental map. Not only will you draw the places you
know best with the greatest accuracy, but you will likely draw those that are important in your life and
leave off those that you don't care about. Many of your attitudes will be reflected by the map [or
description] you draw.6

The information field is a part of an open system, an infinite set of possible
inclusions, but at any one moment the set is finite.7 This limit to the information field
occurs for two reasons. One, I had a finite amount of time with which to produce my

---

&D. Stea, p.9. See also Goodall, Facts on File Dictionary, p.77.


7A system exists in relation to the surrounding environment. The system can be either open or closed in relation to that environment.
An open system is not isolated from that environment. Virtually all geographic systems are open ones. See Goodall, Facts on File
Dictionary, p.335.
description. And two, my description is bounded by the phrase of association, in this case my work environment.

Three observations are apparent from the distribution of the information field. First, there is a clustering of the information and a decay outward. I noted one mountain range in the distance but many more places nearer to my office. I have more knowledge about nearer places than ones farther away.8

Few concepts are more central to the discipline of geography than distance decay. Distance plays a role in the distribution of ideas, technology, population, and interaction of various types, underpins a host of empirical regularities, and constitutes the basis for Tobler's first law of geography.9

Second, but not apparent from the map, the places I mentioned are a function of their information content, or intensity. The post office and stores in the downtown area contain more "information" of interest to me than the open fields and hills to the east of my office, therefore there is a bias towards places with a greater intensity or size. Another way of explaining this is to imagine cities of varying sizes. Those with larger populations have more amenities and services and therefore a greater attraction or intensity. Lastly, and of significant interest to this paper, most of the places I mentioned were to the north, the direction I tend to face while in my office, while there were few, if any, places to the south.

There is another important aspect to my description. I expressed feelings with regard to certain of the places. In fact, the mere mention or omission of places involves affects of which I may or may not be aware. The term affect is used in the psychological sense to refer

---

8 See Goodall, Facts on File Dictionary, p.235.

to a feeling or emotion.\textsuperscript{10} Map I-1 is rather unfair to my description in that it maps only the locations of places I mentioned. It ignores the affects, qualities, perceptions of distance and direction, cultural baggage, etc. I provided in my description.\textsuperscript{11} The map does allow the spatial pattern(s) of my description to become evident.

This paper will look at similar descriptions of where we live to see if there are common spatial patterns. It will show that in addition to a distance-decay of the information field there is a bias in one or more directions to the field, creating an area void of information. This study will consider affects associated with the information field and will look at how certain affects may be associated with certain parts of the information field. The geographer Rapoport supports this notion: "...that among more or less widely shared associations, there may be archetypal associations—that is, certain common responses to certain stimuli, or archetypes defined as the most likely schema."\textsuperscript{12}

The three environments

Let us back up for a moment and reconsider the opening description of my work place. Just what does my description tell us? The passage tells us something about the geographic environment ("...just across from me now, where Rattlesnake Creek enters the

\textsuperscript{10}Affect is the psychological term for the inner experience of an emotion or feeling. The term emotion, by contrast, is used to refer to the combination of experiential, behavioral, and psychological processes involved in states such as anger, fear, and joy." Leff, Experience, p.83. "By the term affect I mean a state of feeling characterized by marked physical innervation on the one hand and a peculiar disturbance of the ideational process on the other. Carl G. Jung, Psychological Types, translated by R.F.C. Hull, (New Jersey: Princeton Bolligen Series, 1971), p.411.

\textsuperscript{11}The affects of my description could conceivably be depicted by stylized symbols. A map using such symbols could be constructed to show a greater amount of information.

river.”). It also tells us something about the contextual environment ("...Higgins Bridge, the Wilma Building, and downtown Missoula where I get my mail.") and my personal environment ("I have plans to hike into the Mission mountains when this paper is completed.") My description, had I continued, would have provided a more detailed, but not complete, picture of these three environments.13

The term geographic environment is used to refer to the external world of geographic facts and objects per se. This includes the built, human and natural elements as well as the known and the unknown.14 Only those elements of the information field that refer to the known geographic environment will be mapped in this study.

The term contextual environment is used to refer to the social class, culture, and stage in the life-cycle of the individual.15 Each of these factors influences my awareness and my life and therefore the information field to be found in my description.

---


15The breakdown of the contextual environment into culture, social class, and stage in life-cycle is based on the work Porteous and Kirk. See Porteous, Environment and Behavior, p.143.
The term personal environment is used to refer to our inner world of thoughts, feelings, dreams, memories, desires, and personal histories. The personal environment is akin to our psyche, "the totality of all the psychic processes, conscious as well as unconscious."16

The personal environment, through based on perceived stimuli from the phenomenal environment, is also strongly influenced by the individual's personality, a complex of attitudes, beliefs, dispositions, preferences, and values. This storehouse of referable information is the experiential environment, because it is built up largely from the experiences of the individual.17

Support for these environments, by whatever names, comes from psychologists, sociologists, anthropologists, and geographers. "It is on the basis of Lewin's field theory, interpreted by the geographer [William] Kirk, that the [above] model of three separate but linked environments is proposed."18 The three environments are depicted in Figure 1-1 and include the elements summarized in Table I-1.19 The figure itself should not be taken too seriously, as it is intended only to illustrate relationships. The effort here is to show that my description, while a product of the three environments, is not the same as any one of the environments but unique to itself.

---


17Porteous, Environment and Behavior, p. 143.

18Ibid., p. 142.

19This figure has been adapted from the ideas of Kurt Lewin, Principles of Topological Psychology, (New York: McGraw-Hill, 1936), John R. Gold, An Introduction to Behavioral Geography, (Great Britain: Oxford University Press, 1980), Porteous, Environment and Behavior, and others.
The behavioral environment

My description is unique. I could have taken longer but my description would still tell you more about me that it would the contextual or physical environments. In fact it also tells more about my "image" of myself than it does about me! These may resemble each other but they are not the same. Just as a map is not the same the "territory it represents"

---

I. Geographic Environment
   A. human
   B. physical
   C. built
   C. known
   D. hidden

II. Contextual Environment
   A. culture
   B. social class
   C. stage of life-cycle

III. Personal Environment
   A. behavioral
   B. experiential
   A. conscious
   B. unconscious

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<td>represents&quot; so the image is not the same as any of the environments from which it is drawn.21 The image is useful to us in the same manner that a map is useful, because it is representative of the environment. Figure I-2 redraws the earlier figure of the three environments with the center circle representing the image. What I wrote comes from my image of myself, my image of my physical environment, and my image of the contextual environment in which I function. The term image is used to refer to a condensed expression of the psychic situation as a whole. Here the Swiss doctor and founder of Analytical Psychology, C. G. Jung, discusses the concept of the image.</td>
</tr>
</tbody>
</table>

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The inner image is a complex structure made up of the most varied material from the most varied sources. It is no conglomerate, however, but a homogenous product with a meaning of its own. The image is a *condensed expression of the psychic situation as a whole*, and not merely, nor even predominately, of conscious contents pure and simple. It undoubtedly does express unconscious contents, but not the whole of them, only those that are momentarily constellated. This constellation is the result of the spontaneous activity of the unconscious on the one hand and of the momentary conscious situation on the other, which always stimulates the activity of relevant subliminal material and at the same time inhibits the irrelevant. Accordingly the image-space is the expression of the unconscious as well as the conscious situation of the moment. The interpretation of its meaning,
therefore, can start neither from the conscious alone nor from the unconscious alone, but only from their reciprocal relationship.\textsuperscript{22}

The following lines by Kenneth Boulding are also helpful in understanding what is meant by the term.

What I have been talking about is knowledge. Knowledge, perhaps, is not a good word for this. Perhaps one would rather say my Image of the world. Knowledge has an implication of validity, of truth. What I am talking about is what I believe to be true; my subjective knowledge. It is this Image that largely governs my behavior.... \textit{The first proposition of this work, therefore, is that behavior depends on the image.}\textsuperscript{23}

The image is a condensed expression of the psychic or personal environment, both consciousness and unconscious, and the geographic and contextual environments, both known and unknown. The image is the gestalt or "the coordinated whole and not the several objects, people, etc. of which it is composed." \textsuperscript{24} Gestalt refers to a "system whose parts are dynamically connected in such a way that a change of one part results in a change of all other parts." \textsuperscript{25} Psychologist Kurt Lewin's representation of behavior as a function of the environment and the person is extended to include the three environments, where
\[
\text{Behavior} = \int [\text{Geographic, Contextual, Personal}].\textsuperscript{26}
\]
It is reasonable to expect that our image as well is a function of these environments.\textsuperscript{27}

\textsuperscript{22}Jung, \textit{Psychological Types}, pp.442-443.


\textsuperscript{25}Lewin, \textit{Topological Psychology}, p.218

\textsuperscript{26}Lewin represented behavior[B] as a function of the environment[E] and the person[P] with the function $B = \int [E,P]$. He referred to this as the life-space of the individual. Lewin, \textit{Topological Psychology}, p.12. Lewin's life-space represented the whole situation(s) of both the person and the environment.

That part of the image containing spatial relationships, locational data, and attributive knowledge is referred to as the cognitive schema. The term was suggested by Yi-Fu Tuan to overcome some of the difficulties and confusion in the literature. According to him the cognitive schema is the mental framework in which spatial relationships and locational data are stored and organized. Schema are coding systems within which past experiences and present environmental or sensory experiences are organized in a context which is both locational and attributive.

There is another concept important to introduce at this juncture. Our image space is not space in the same sense as space in the phenomenal environment. For this reason psychologists Lewin and Koffka, and the geographer William Kurt developed the notion of the behavioral environment. We act and do business in the space of this environment. The behavioral environment is;

...psychophysical field in which phenomenal facts are arranged into patterns or structures (gestalten) and acquire values in cultural contexts. It is the environment in which rational human behavior begins and decisions are taken which may or may not be translated into overt action in the Phenomenal Environment.

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29 Tuan writes: "To account for spatial abilities we need to postulate "schemata" rather than images and mental maps...It cannot be assumed that people walk about with pictures in the head, or that people's spatial behavior is guided by picture-like images and mental maps that are like real maps." Ibid., p.213.


31 "[Koffka] may have been the first to distinguish between the geographic environment (or absolute space) and the behavioral environment (or relative space)." Downs and Stea, "Introduction," p.5, citing Koffka, *Principles of Gestalt Psychology*, (New York: Harcourt Brace, 1935).

Because the behavioral environment is defined by our psyche as it is extracted from the geographic, contextual and personal environments, it takes characteristics and qualities from each. It is at once space and image. Downs and Stea, in their introduction to the book *Image and Environment*, discuss this environment as "towards a gestalt."

Koffka held that the geographical environment is not a stimulus or set of stimuli in itself, but is "stimulus-providing," and that the mediation of the behavioral environment clarifies the relationship between the geographical environment and behavior:

Behavior takes its place in a behavioral environment, by which it is regulated. The behavioral environment depends upon two sets of conditions, one inherent in the geographical environment, one in the organism. But it is also meaningful to say that behavior takes place in a geographic environment... (1) Since the behavioral environment depends upon the geographical, our proposition connects behavior with a remote instead of an immediate cause... (2) the results of the animal's behavior depends not only upon his behavioral but also upon his geographical environment...The geographical environment, not only the behavioral, is changed through all behavior.

Lewin, whose association with Toleman was closer, stressed the relationship of and distinctions among mathematical space, physical space, and psychological life space, concepts which resemble those of Koffka. Lewin developed a "topological" or "hodological" psychology, stressing the connection and paths between psychological regions.... The single connected space in which all physical reality is included does not exist within topological psychology, each life space being viewed as dynamically unique and equivalent to the totality of the physical world.33

Although image and behavioral environment are used in much the same manner, the terms are not defined in quite the same way. Image is more closely associated with our psyche whereas the behavioral environment is an environment with pseudo-spatial qualities.

**Inlymaps**

If it [concept of the schema] is valid, we have a "body schema" or "body image" as the closest spatial organization and this indeed has been the subject of some interesting clinical work in recent years. After that, and partially dependent on it, we have schemata relating to familiar rooms --to the house and family, to the street, precinct, neighborhood, side of city, city, country, country and world. Each one will depend partly on the other. All of them depend mainly upon the unique kinds of experience that we have had as we live and play and work and go to school, and partially upon regularities that depend on our being human beings and having had experiences that are general to our species. *Schemata are related to, but by no means coincident with, the physical reality that lies outside us.*34

Terrance Lee

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34 Lee, "Living Space," p.98.
This study concerns the image as a whole or gestalt. The purpose of this study is to develop a methodology that produces maps of the image, and to test the hypothesis that the image has a spatial orientation with associated affects. These maps will be referred to as inlymaps. The term *inlymap* is introduced to refer to methodologies which are directed toward mapping the image as a whole. Inlymap is derived from:

*Inly*: within, internal, intimately, in the heart, inner nature.
*Map*: representation of spatial relationships and forms.

Recall the description that began this paper. Map 1-1 was made from the elements of this description having spatial identities (location in the geographic environment.) We can calculate a mean center, minimum travel distance center, orientation, standard deviational ellipse, etc. In short, all the tools available to study a set of spatial data can be used to see if the methodology is sound, the image shows orientation, or the image exhibits spatially associated affects.

Map 1-1 shows the location of the information field in the description. Using this map as a guide, with the associated information field, some terms will be defined and a simple analysis will be conducted to demonstrate in graphic terms the intent of this work. Map 1-2 and Map 1-3 show this. An information field region, in the context of the inlymap, is defined as follows:

**Information field**: "The mental information that an individual has about the spatial distribution of a specific set of environmental elements. Most information fields display distance-decay characteristics, i.e. the individual has more information about nearer places than ones further away. Such private or spatial information fields will be the areas an individual knows best and within which his/her activities will be located."35 In this paper the information field or information field region is defined from a set of recalled

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places. The information field is comprised of three areas: the core area, the field area, and possible island areas.

The information field is grouped into the core area, field area and islands.

Core area: A core area is defined on the basis of the clustering of the information field around the center. The core area is the area containing the greatest density of places. The core area emerges more or less self-defined from observation of the distribution of places in the information field. It contains upwards to 60% or more of all places. The core region dominates awareness over the periphery. The idea of "center" and "periphery" in spatial organization is perhaps universal. People everywhere tend to structure space—geographical and cosmological—with themselves at the center and with concentric zones (more or less well defined) of decreasing value beyond.

Field area: The field area is an area that does not fall within the boundaries of the core area but is continuous with this area within the information field. It contains the remaining elements of the information field that are not to be found in isolated or discontiguous islands.

Island(s): Islands are discontinuous parts of the information field not within the core or field. They are surrounded by areas lying outside the limits of the information field.

The information field has a limit, or outer margin, a center, and possible orientation.

Information field limit: The information field region is an open system. However, at any one moment in time it is defined by the limits of the key phrase of association. The places furthest from the median center define the limit(s). Islands define their own limits. To simplify the analysis of the sample cases later in this paper a study area limit will be imposed on the maps.

Center: The cognitive center, a hypothetical place or places (based on the location of the home, work and/or school) is located within the core area. In

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3Ibid., p.96.


3In the case of this study it will be the place with which you live with on a daily and weekly basis.
Information Field

- Location of point in the field.

/ Desire Lines from Median Center.

- Location of Areal Mean Center (includes Stewart Peak & Council Grove).

Missoula, Montana 1:100,000 N

Map 1-2 Center & Desire Lines

this study the median center or minimum aggregate center of travel as
determined from the information field, is used to define a cognitive center.\textsuperscript{39} This is the center from which desire lines are drawn to each element in the information field. The areal mean center is not used because elements at great distances from the core skew the location.

**Orientation:** "I use this term to denote the general principle governing an attitude (q.v.). "Every attitude is oriented by a certain viewpoint, no matter whether this viewpoint is conscious or not"\textsuperscript{40} In this study orientation is defined loosely as the direction out from the center showing the greatest dispersion of places (in both number and distance). Although the orientation is not always defined, and not always defined in one direction, a direction is often apparent.

Map 1-2 shows desire lines drawn from the center to the individual points. Desire lines are "...straight line[s] drawn on a map between the point of origin and the point of destination..."\textsuperscript{41} In looking at Map 1-2, it is evident that the area opposite the direction of orientation from the core is missing information. For this reason an empty-space region is said to exist and is shown on Map 1-3.

**Empty-space:** The empty-space comprises an area of the map that is significantly missing information. If the dispersion of information is equal in all directions from the center no such region is defined. The empty-space is simply defined in terms of the information field and is not, at this time, associated with a part or parts of the person or personal environment such as the unconscious.

The boundary between the core area and the empty-space is a sharp boundary. When the dispersion of information decays outward from the core, through the field area, to the limits of the field nothing is unusual, the decay can be described as a function of distance.

\textsuperscript{39}The extreme locations of Stewart Peak and Council Bluffs, which are not shown on the maps, are included in the calculations of the areal mean center and the center of minimum aggregate travel distance. Because these extreme values exert a bias influence on the location of the mean center we use the center of minimum aggregate travel distance as an indicator of a "cognitive center".

\textsuperscript{40}Jung, Psychological Types, p.456.

Regions & Areas

- Median Center
- Office
- Orientation

Missoula, Montana 1:100,000

Map I-3 Regions & Orientation
and intensity. But when the decay is sharp and abrupt, as it is between the core area and the empty-space, a tension-boundary is defined.

**Tension-boundary:** The boundary [of a psychological region] is determined by "those points of a region for which there is no surrounding that lies entirely within the region.... Psychologically one can distinguish sharp and unsharp [soft] boundaries. In the case of a sharp boundary it can be determined for every point of the life space whether or not it belongs to the region in question."\(^{42}\) Tension is a "state of a region relative to surrounding regions. It involves forces at the boundary of the region which tend to produce changes such that differences of tension are diminished."\(^{43}\) The abrupt boundary between the core area and the empty-space, between two dislike areas sharing a common boundary, is a tension-boundary.

Map I-3 shows the core area, field area and islands, the limits to the information field region, the empty-space region, and the sharp boundary between the core and empty-space. These maps are interesting because they show support for the hypothesis that there is an orientation bias to the image. In showing such a bias they also show what is referred to as the empty-space. Is the methodology that produced these maps sound, and when refined will it show support for the hypothesis when tested with a sample population? Will these different areas and regions show associated affects common to a given population? These are several of the questions to be answered by this study.

**The image-space**

Probably the most consequential single finding in the field of human consciousness research is the discovery of the startling extent to which our perceptions, motivations, values, and behavior are shaped by *unconscious beliefs* which we acquire from our early experiences and from the cultural milieu. These unconsciously held beliefs (e.g. "I am inadequate," "The world is hostile") amount to an "inner map."

\(^{42}\) **Lewin,** *Topological Psychology,* pp.215-216.

\(^{43}\) Ibid., p.218.
These unconscious beliefs determine where we experience limits to our own powers, and they block us from fuller use of the inner resources available to us.44

Willis W. Harman

Consider once again my description. Many factors merge together in my image of the river roughly thirty meters to the north of my office. It is a physical river. It is a contextual river. It is a personal river. The river is called the Clark Fork in 1992. I experience many things in this river. I know about William Clark, the Columbia watershed, Astoria on the coast and fog; I know about lead contaminating the groundwater at Anaconda, and I know about autumn colors and winter winds. The river is a part of my imagination. As I access this image I access an entire image, a wealth of information and experiences. The image or cognitive schema may be more or less geographically accurate. But more importantly it is a condensed expression of my psychic situation as a whole. Read what Carl G. Jung has written:

Idea and thing come together, however, in the human psyche, which holds the balance between them. What would the idea amount to if the psyche did not provide its living value? What would the thing be worth if the psyche withheld from it the determining future of the sense-impression? What indeed is reality if it is not a reality in ourselves, an esse in anima? Living reality is the product neither of the actual, objective behavior of things nor of the formulated idea exclusively, but rather of the combination of both in the living psychological process through esse in anima.45

My image contains places, regions, corridors, landmarks, etc.; and these are associated with affects, distance perceptions, and contextual elements which have come together in my image. I make no distinction between the different environments in my image. They are all one. "In the natural attitude, I do not have perceptions. I do not posit this object as

45Jung, Psychological Types, pp.51-52.
beside that one, along with their objective relationships, I have a flow of experiences which imply and explain each other both simultaneously and successfully."46

There are spaces in my images that appear to be empty. How do I experience such places? Perhaps such places are truly unimportant to me. It is possible that such places reflect aspects of my unconsciousness self that are not constellated. It is possible that they reflect my relationship to projected aspects of my unconscious self. It is beyond the scope of this study to attempt to answer these questions. This study limits itself to showing that such areas exist. Map 1-3 shows the location of this area. The term image-space will be used to indicate the whole of the space, both empty and filled with information. Figure 1-2 shows the image-space as a part of the behavioral environment.

The image-space contains affects and associations that are projections. Projection is a much used term (by psychoanalysts) to describe a situation where, according to Ken Wilbur, an "impulse (such as drive, anger, desire) which arises in you and is naturally aimed at the environment, when projected, appears as an impulse originating in the environment and aimed at you."47 Wilbur goes on to say: "Those items in the environment (people and things) that strongly affect us instead of just informing us are usually our own projections."48 The concept is an important one in understanding why our image is not the same as the geographic environment. Marie-Louise von Franz describes projection as

...a psychological fact that can be observed everywhere in the everyday life of human beings, namely, that in our ideas about other people and situations we are often liable to make misjudgments that we later have to correct, having acquired better insight. In such cases most people acknowledge their

48 Ibid. p.94.
mistake and let the matter drop, without bothering to ask themselves where the false judgment or incorrect idea came from. The psychologist, however, cannot avoid this question, because to a quite special degree he must concern himself with correcting such misjudgments, since even with his usual neurotic patients he has to battle with these "crazy" ideas that impede the patients' adaptation. 49

Map 1-1, Map 1-2 and Map 1-3 are maps of my image in geographic space; maps showing biases, orientations and preferences. Put quite simply our image-space is a map of our psyche, it's projections, and omissions. From these maps we can ask the questions: 1) Where is it? Where is the information field and where is it missing? 2) Why is it where it is and why is it missing? Why is the image oriented in a certain direction? Why is the empty-space where it is? 3) Of what consequence is it's location and it's presence? This study will deal primarily with the first question in developing a methodology. It will address the second question in in trying to explain patterns found in the inlymaps.

The approach of this study is humanistic although the methodology tends to reduce the problem to determining (x,y) co-ordinates in Cartesian-Euclidean space. "Until the last ten years, environment-behavior research was largely positivist in philosophical focus, studying environmental behaviors and events in aggregate, quantitative terms." 50 Although it may appear that this work is positivist in approach this is not the case. Certainly the work emphasizes theory, hypothesis-testing and verification but it also emphasizes self-awareness and mutual-awareness, important elements of a humanistic approach. 51 At times mathematical verification of the results is given undo attention, whereas the experience of the


individual is not given enough emphasis. But this is largely because of the scope of the endeavor.

Methodology and theories are important to this study as they are to most environment behavior studies. Phenomenology, "the exploration and description of the essential nature of things and experiences as they are in their own terms", best characterizes the humanistic approach of this work.

Before anything else, phenomenology is a way of working which fosters deeper and clearer seeing through efforts to direct intuitive insight towards a particular topic such as place, routine, architecture space, or landscape character. In this sense, phenomenology is a learning tool which can help us to discover more about ourselves, others, and the world in which we live.

The world in which we act is not a world of meaningless things (what Kirk, 1963, calls a phenomenal environment) but a created world of meanings interpretations (the behavioral environment, according to Kirk). The two overlap, of course, but must not be equated. To understand how people act, one must appreciate the context in which they act -- the behavioral environment, which is a repository of the meanings that they attach to phenomena; one must study their subjectivity objectively.

This paper will demonstrate that there are spatial patterns to our image-space. It will show that our image of the environment(s) is embedded with personal and cultural affects. It will argue that the image-space is a function of the three environments and contains affects and projections. The research conducted as a part of this paper will show that the image shows orientation and contains empty-spaces.

This paper will map information fields, similar to the one in the opening description. The patterns to these fields will be grouped and then compared to associated affects and

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distance perceptions. These will show that we cannot underestimate the importance of the psyche in influencing our perceptions, experiences and behavior. A convincing case will be made that in addition to the traditional variables of economic theory; distance and population (or intensity), a third variable exists: that of orientation. Chapter Two will lay a foundation for this research by examining some of the research that has been done. Existing methodologies are reviewed in Chapter Three. Chapters Four, Five and Six state the problem, describe the research and state the conclusions.
Chapter 2

BACKGROUND

The discussion in the preceding chapter of the image, behavioral environment, my description and the maps made from this description, suggests three aspects to this study. **First,** the image has contents which are extracted from three different environments. **Second,** these contents are organized not in the Euclidean space of the geographic environment but in the topological space of the behavioral environment. And **third,** the image, a product of our psyche, contains affects, projections, memories, future plans and fantasies which all greatly influence both the contents and their locations in the image. Each of the three environments, in its own right, is studied by a multitude of disciplines. Chapter Three will discuss relevant methodologies from selected disciplines; this chapter provides some background on each of the three aspects of this thesis. Simple as conducting such a study may appear to be, these words by the geographer Yi-Fu Tuan offer appropriate caution.

"My principal thesis is this: to understand human reality better it helps to see people and their works as composed of realism and fantasy. The concepts captured by these two worlds give us a handle to explore human nature and culture. It is, however, a slippery handle, for although "realism" and "fantasy" have clear and appropriate meanings conceptually, their application to real-life situations is often ambiguous and problematic."56

A multidisciplinary approach

Every image and idea about the world is compounded, then, of personal experience, learning, imagination, and memory. The places that we live in, those we visit and travel through, the worlds we read about and see in works of art, and the realms of imagination and fantasy—each contribute to our...

images of nature and man. All types of experience, from those most clearly linked with our everyday world to those which seem furthest removed, come together to make up our individual picture of reality. The surface of the earth is shaped for each person by refraction through cultural and personal lenses of custom and fancy.57

David Lowenthal

This study uses a multidisciplinary approach to the study and understanding of spatial cognition. It draws on a variety of fields of study, among them cognitive behaviorism, behavioral geography, environmental psychology and psychotherapy. Researches from these areas have all studied the behavioral environment from different perspectives.

Cognitive behaviorism is based on the hypothesis "that a person reacts to his environment as he perceives and interprets it in light of his previous experience."58 Perception is seen playing a key role in the individual's responses and decisions.59 The result is an ego-centered interpretation of the environment.60

Behavioral geography is "an approach in human geography which uses the assumptions and methods of behaviorism to determine the cognitive processes involved in an individual's perception of, and response and reaction to his environment."61 The body of work on the subject of the image, cognitive schema, mental and cognitive maps, and related


60Goodall, Facts on File Dictionary, p.76. "Cognitive or environmental behaviorism describes the situation where people react to their environment as it is perceived rather than what it really is. People interpret the environment through their previous experience and knowledge, giving a subjective or ego-centered interpretation of environment." Ibid., p.76. "Cognitive behaviorism holds that the impact of environment on people is partly dependent on perception (cognition) of the resources and barriers it poses." Haggett, A Modern Synthesis, p.238.

61Clark, Longman Dictionary, p.58. Behavioral geography presents an "approach to human geography which adopts the methods and concepts of behaviorism, a general movement which has spread into the social sciences in recent years (1987) from the behavioral sciences, to explain spatial patterns of behavior in terms of cognitive processes. The behavioral approach views people as 'thinking' persons and is interested in the way in which people come to terms with their physical and social environments, i.e. the cognitive processes through which individuals codify, respond to and react upon their environments.... The emphasis, however, has been on the individual's 'mechanical' responses to spatial and social structures rather than on an understanding of the motivations underlying the behavior." Goodall Facts on File Dictionary, pp.37-38.
topics has developed during the past twenty years, much of the research having been done during the 1970's. The ideas researched and expressed in the fields of behavioral geography and environmental perception are not, however, new. "Sauer, Wright, and Kirk among others had all emphasized that people behave in the real world, not on the basis of objective knowledge, but in terms of subjective images of it."^{62}

Environmental psychology involves the study of the complex interactions between people and their environment. It "attempts to broaden the scope of psychology by explicitly studying behavioral processes in real-world settings."^{63} "The whole field of environmental psychology can in fact be defined as the study of the interrelations between psychological and environmental variables."^{64} Although behavior is place specific (we do different things in different places) place alone is not enough to explain behavior.^{65} Studies include association tests between affects and places, things and people.

Psychotherapy is the usage of any "technique or procedure that has palliative or curative effects upon any mental, emotional, or behavioral disorder."^{66} The term is used to refer to any number of modern schools (for example Analytical Psychology) dealing with

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^{63}Gold, Behavioral Geography, p.15. Environmental psychology, a "...relative new [1985] discipline within psychology,...is a true synthesis drawing from the data and theories developed in a variety of areas including social psychology, sociology, ethnology, political science, architecture, and anthropology and turning them upon, as the name suggests, issues involving the complex interactions between people and their environments." Reber, Dictionary of Psychology, p.243.

^{64}Leff, Experience, p.10. Note also that there is "no generally accepted definition of environmental psychology," Gold, Behavioral Geography, p.15.

^{65}This central fact of environmental psychology [people do different things in different places] has generally been accounted for as an example of 'respondent' behavior in which the place elicits (i.e. causes) the behavior. Even more obvious is that the place elicits the cognitive and affective 'responses' to that place." Lawrence. Ward, Jacalyn Snodgrass, Barry Chew, and James Russell, "The Role of Plans in Cognitive and Affective Responses to Places," Journal of Environmental Psychology 8 (1988):1.

psychiatric analysis.\textsuperscript{67} Case studies in psychotherapy address the psyche, but not the image or cognitive schemata per se.

Literature in the area of environmental behavior research is contradictory and confusing. Terms and concepts are not standard, nor are methodologies.\textsuperscript{68} While some researchers feel that mental maps do not exist, others produce mental maps. Each author comes to study the image from his different disciplines with unique terminologies, biases and approaches. Gold reminds us that trying to demarcate mental activity exclusively into one category or the other is counter-productive.\textsuperscript{69} This study uses the research approaches of a variety of disciplines in an effort to better understand the image.

The geographer Yi-Fu Tuan coined the term \textit{topophilia} to denote "the affective bond between people and place or setting."\textsuperscript{70} We could say that this study is a study in topophilia. It is also a study in cognition; "...the psychological process whereby human beings or other organisms obtain, store, use, and operate on information."\textsuperscript{71} And it is also a study in perception. Kevin Cox describes perception as those "... pieces of knowledge which are acquired by the individual as a result of his visual, tactile, verbal, and auditory


\textsuperscript{68}Downs & Stea, "Introduction to Image \& Environment," p.6.

\textsuperscript{69}Gold, \textit{Behavioral Geography}, pp.42-43.

\textsuperscript{70}Tuan, \textit{Topophilia}, p.4. Tuan's philosophical books have been invaluable to this study. See also Yi-Fu Tuan, \textit{Space and Place: The Perspectives of Experience}, (Minneapolis, MN: University of Minnesota Press, 1977).

\textsuperscript{71}Leff, \textit{Experience}, p.81.
contacts with the environment about him. They are not necessarily accurate by scientific standards; rather they are more or less accurate."72

Distinguishing this study is the manner in which it looks at the image. In considering the image as a whole or as a gestalt the image is "a great deal more than the sum of the perception of those objects which make up the environment."73 Chapter Four looks at methodologies that enable the image to be studied in this manner.

Euclidean versus topological space

Psychologists have examined the psychological bases of space-perception.... The basic result of this research appears to be that the visual perception of space is non-Euclidean and that it is in fact a Riemannian space of constant negative curvature (i.e. it conforms to the principles of Lobachesukian geometry). This simple amounts to saying that we do not see in straight lines as defined by Euclid.74

David Harvey

Were the geographic environment alone responsible for the elements in the information field, decay would occur more or less equally in all directions or at least exceptions to this equal decay could be explained as the results of purely geographic factors. Were the psyche alone responsible for the elements of the information field, the distinction would in all probability, have little or no relation to geographic space. The facts of the image, however multilayered, incomplete, contradictory, complex, and apparently irrational

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"Perception, attitude, value, and world view...their meanings overlap....Perception is both the response of the senses to external stimuli and purposeful activity in which certain phenomena are clearly registered while others recede in the shade or are blocked out." Tuan, Topophilia, p.4.


compose a mental map that allows us to function in the world. Lewin, in his work

*Topological Psychology*, writes:

The thesis that psychological facts, such as dreams and wishes, have no place in physical space has long been accepted as self-evident by the physicist. This thesis is also generally accepted in psychology and constitutes the main reason for the assumption that psychological facts are in general of a non-spatial nature. Nevertheless attempts are continually being made in psychology to "coordinate" dynamic facts in psychology to physical facts.\(^{75}\)

The cognitive schema cannot be considered to be structured in the same way as the Euclidean space of maps and of what might be said to be the geographic environment. Euclidean space refers to relationships "structured in terms of horizontal and vertical lines, squares, rectangles, triangles, and circles."\(^{76}\) According to Lewin, psychological space does not deal with one single connected space representing the totality of its world, as does physics. Rather its subject matter is a plurality of separate spaces.\(^{77}\) Lewin writes:

Despite the changes in the concept of physical space during the recent development of physics [1936] one has always considered physical space as one single connected space that includes all existing physical realities. Psychology, on the other hand, does not deal with one single connected space of psychologically real facts. Especially when one takes "effects" as the basis for the construction of psychological spaces, one will have to think of each individual's life space as an entirely separate world. A wish which plays an essential part in the life space of the individual A may possess no psychological reality for the individual B.\(^{78}\)

A child may experience his mother as being between himself and a toy (irrespective of geographic location) simply because his mother is the locomotion by which he reaches his toy.\(^{79}\) I may experience the apartment building of subject #36 to be closer to my office

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\(^{75}\)Lewin, *Topological Psychology*, p.66.

\(^{76}\)David Boardman, *Graphicacy and Geography Teaching*, (London: Croom Helm, 1983.), p.11.

\(^{77}\)Lewin, *Topological Psychology*, p.68.

\(^{78}\)Ibid., p.67.

\(^{79}\)Ibid., p.47.
than it is in geographic space because I like her. Mapping the image, an essentially non-Euclidean reality, is therefore problematic. The space we are concerned with in this paper is the space of the psyche. The Euclidean space of the phenomenal environment is organized to meet the demands of our personal environment, and the projections of our psyche. This organization forms the underlying basis for the organization of the behavioral environment, or cognitive schema.

The closest, most direct route to the "toy" is, as had been said, towards the mother, despite it's location in the environment. Because we experience in and through the behavioral environment we do not experience the disparity between our image and the world within which we move. We structure our space with a topological integrity that reflects a gestalt of the three environments. In short, it allows us to navigate and to dwell in these worlds. Certainly at times we will encounter conflict between the manner in which space is organized in our image and the geographic environment. When this happens either we quickly adjust our schema or deny the conflict because such an adjustment would compromise elements within our psyche which we are unwilling to alter. Still we need to develop a non-Euclidean model with which to study the cognitive schema. "This leads me to suggest that we ought to progress beyond the convenient use of two-dimensional Euclidean space as a model of cognitive space. We ought, moreover, to move beyond the use of any metric and investigate other geometries as Harvey suggested...."80

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"Topology is a branch of mathematics that ignores quantities and deals only with the formal relations between components."\(^{81}\) In my description which began this paper I omitted an entire area between my office and the garage. On closer inspection of this area I notice that it is filled with "information". My image however, is topologically continuous. I experience space as reaching out in all directions from my location.\(^{82}\) Missing areas simply do not exist in so far as my image is concerned. Piaget and Inhelder describe the image from their studies of behavior:

...children automatically progress from perception of the topological characteristics of objects (characteristics such as proximity, separation, order, enclosure, and continuity), through perceptions which encompass perspective and projective relationships, to the ultimate ability to organize all objects in space in terms of some common structure, such as a Euclidean system of co-ordinates. Most writers agree that the actual physical space which people experience and perceive is not measurable different from being Euclidean in structure. Euclidean geometry may thus be regarded as a natural outgrowth from tactile and learned visual experience, and certainly much of the initial justification for Euclidean geometry relied upon an appeal to the 'self-evident' nature of the Euclidean axioms.\(^{83}\)

Gatrell takes exception to this:

Related to this criticism is the assumption that Euclidean geometry is the one to which all adult cognitive mapping aspires and that it represents some ideal standard that ought to be attained. Such attainment is required because that is how the real world is. Yet as Downs and Stea note, "Euclidean and Newtonian views are effectively models of real world geometries - physical systems rather than givens. Because these represent the ways in which we have been taught to think, we impose criteria derived from out views of the world upon the developing child, referring to his attainment of adult models as development." We act as if such a representation epitomizes some kind of 'optimal' cognitive map. Given that there is no such thing as the real world, we might doubt the wisdom or usefulness of relating a cognitive space, via bidimensional regression perhaps, to physical space.\(^{84}\)


\(^{82}\)Tuan, Space and Place, pp.34-35.


Parts of our image will appear with the geographic clarity and detail of a topographic map while others will bear little resemblance to this at all, being more like an annotated page from a child's journal. We may or may not be aware of which is which, all the pages blending together to form a continuous topological surface, multilayered and complex.

"It is clear from Piaget's work that every person does not go completely through all possible developmental stages he describes, and, in consequence not every mind can achieve a complete and ultimate development of representational space. 'In fact, it seems likely that those who attain that conception are in the minority.'85

There is an aspect to the elements in our image, and in their organization that is worth mentioning. We cannot possibly duplicate the degree of detail, and the accuracy of location in Euclidean space for all the elements in the geographic environment. We select and choose which direction to look, which bridge to cross, which newspaper to read and which college to attend. There are limits to what we can perceive, rate, judge, remember, and attend.86 Some elements of our image are a blur. Our image, made up of 'things' and the 'spaces between things' contains details and contains generalities.87 Consider for a moment a topographical map. The map is an attempt to present us with certain selected facts, equally and unbiased (i.e. cultural, topological, and riparian features.) In looking at this map we can only consider so much before we stop seeing details. "Generalization, if you wish to call it that, occurs, spontaneously in all perception. Complex though a map may be, the mind derives from it a simplified pattern."88 It is quite likely that parts of our image

85Robinson and Petchenik, The Nature of Maps, p.103.
86See George A. Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information" Psychological Review 63:2 (1956):81-97.
87M. Merleau-Ponty, Phenomenology of Perception, p.15.
are deliberately generalized, blurry, and lacking in "details". In this famous passage by F. Waismann the subject is described eloquently.

"Imperfection of the senses"—this phrase only provokes the question, What exactly would perfection be like? Can it be described? Suppose that I glance up at the night sky for a moment and am to tell how many stars I have seen; would it be right to reply "I have seen \( n \) points of light, but I don't know what number \( n \) is?" That is, must I have seen some definite number though I can't tell how many? .... Again, suppose that I look out into the rain. If I am to put into words what I see I am faced with much the same difficulty. The picture of the rain is typically blurred. Perhaps in the foreground I see a few drops (which I can even count) and then a streaky background fading away into gray. The idea of a 'perfect perception' now seems to be such that we can take in in an instant the number of light points or drops we see, and say precisely how many there are. But this is a mistake. My uncertainty is not due to my not having looked carefully enough; for however carefully I may look, or scan over the picture of rain, my impression will always remain the same. The blur is just as essential a feature of sense perception as other features are, e.g. the limitedness of the visual field; i.e. without the blur it would no longer be what it is. It would turn into something radically different, something of which we have hardly an idea, anyhow not a clear one.... The point is that sense perception is inexact in a very different sense from that in which, e.g., a painted picture, or a map, is inexact. I may say, for instance, that one map is more accurate than another map, in the sense that it is more faithful, more detailed, on a larger scale, etc. But when I say that a map is more accurate than a description given in words, the sense of 'accurate' has shifted. A verbal description is less accurate in a more fundamental sense.

The various aspects of the image are loosely hung on a web of Euclidean space while maintaining a topological integrity of their own, an integrity in harmony with the complexities of our own psyche. In this paper the pattern of the behavioral environment is of primary concern. Simply mapping the contents of the information field or image in Euclidean space may negate the integrity of any pattern. Thus an effort will be made to understand the spatial organization of the cognitive schema. Several methods have traditionally been used to do this and these will be discussed in the following chapter.

Affects and projections

I like some places while I dislike others. Some places I avoid deliberately and some places I avoid for no apparent reason. There are places of which I have fond memories.

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There are places I associate with fears and others with loss. How does my unconscious self, and my affects come to influence the contents of my image and therefore my behavior? This is a question difficult to answer.

The image is composed of elements both conscious and unconscious. The unconscious elements, simply all that is not perceived by the ego, may, as in dreams, drift to the edge of consciousness and become visible.\(^9\) This is what Jung has to say about the relationship between the conscious, the unconscious, and the psyche.

By consciousness I understand the relation of psychic contents to the ego (q.v.), in so far as this relation is perceived as such by the ego. Relations to the ego that are not perceived as such are unconscious (q.v.). Consciousness is the function or activity which maintains the relation of psychic contents to the ego. Consciousness is not identical with the psyche..., because the psyche represents the totality of all psychic contents, and these are not necessarily all directed with the ego, i.e., related to it in such a way that they take on the quality of consciousness.\(^9\)

Goleman notes that there "is now firm scientific evidence that the unconscious mind plays an immensely potent role in mental life."\(^9\) He continues by citing Fyodor Dostoyevsky;

Every man has some reminiscences which he would not tell to everyone but only to his friends. He has others which he would not revel even to his friends, but only to himself, and that in secret. But finally there are still others which a man is even afraid to tell himself, and every decent man has a considerable number of such things stored away.\(^9\)


\(^9\)Idem., *Psychological Types*, pp.422-423. "We do not know its [unconscious] nature in and for itself, but we observe certain effects from whose qualities we venture certain conclusions in regard to the whole of the unconscious psyche." Jung, *Structure and Dynamics*, p.287.


Jung supports the position that we will necessarily meet the unconscious parts of our psyche in the environment; the behavioral environment in this case.

"As we know, it is not the conscious subject but the unconscious which does the projecting. Hence one meets with projections, one does not make them... No matter how obvious it may be to the neutral observer that it is a matter of projections, there is little hope that the subject will perceive this himself. He must be convinced that he throws a very long shadow before he is willing to withdraw his emotionally-toned projections from the object."\(^{34}\)

It is a fundamental postulate, even fact, of psychoanalysis that all unconscious contents appear in projection upon the contents of the external world.\(^{95}\) These projections bind us to our environment.\(^{96}\) Are certain parts of our psyche constellated in certain parts of the behavioral environment? We can speculate that the center of the image-space is associated with our ego, our image of ourself, family, home, work, and self. But what about other elements of our image-space or elements of our self?

Porteous draws a parallel between our house and our body. "The environmental explorer Harbison, the psychiatrist Jung, the poet Neruda, the phenomenologist Bachelard would all agree with the prophet Gibran that 'your house is your larger body.'\(^{97}\) This paper draws a parallel between our behavioral environment and self; 'your image is your larger body'. The image is an extension of our image in space; front, back, oriented and selective.\(^{98}\) Several methods used by psychologists to determine affects are discussed in

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\(^{94}\)Ibid., p.265.


\(^{98}\)See Tuan, Space and Place, pp. 34-50.
Chapter Three. These are evaluated will be used to determine what affects are associated with what parts of the behavioral environment.

Civilization, becoming increasingly complex, lost the knowledge of these events [magic rituals, etc]. It encountered the things of the other world by inhibiting, repressing, and later by 'spiritualizing' and 'subjectivizing' them. Here lies the root of all 'theories of projection', which were one day to be developed by Feuerbach and Marx, by psychoanalysts and by positivistic critics of ideologies. That which was outside slipped to the inside, and if on occasion it was unable to deny its original character, it was integrated into subjectivity as being that which was 'projected'.

Topoanalysis

Descriptive psychology, depth psychology, psychoanalysis and phenomenology could constitute with the house, the corpus of doctrine that I have designated of the name of topo-analysis. On whatever theoretical horizon we examine it, the house image would appear to have become the topography of our intimate being.

Gaston Bachelard

Bachelard, in his very thought provoking study, The Poetics of Space, suggests somewhat fancifully, that along with psychoanalysis, every patient should be assisted in making a topoanalysis, or an analysis of the spaces and places which have been settings for his past emotional development.

Clare Cooper

This study involves conducting an inner analysis of spaces and places: Bachelard's topoanalysis. In this case it is not done by or with the individual but on materials they will supply. The topoanalysis is attempting to see; 1) what elements compose the image, 2) where in 'space' these elements are and how they are organized and 3) what affects are associated with these elements. Roger Downs and David Stea suggest some reasons for conducting such an analysis.

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The principal reason for attempting to understand cognitive mapping is that the world as we believe it to be serves as the basis for much of our spatial behavior. Although cognitive mapping forms part of our mysterious "second nature" and is largely out of our immediate awareness, we should recognize that it is subject to a series of social pressures which influence and guide and, in some cases, make use of its operation. Beyond all of the strictly utilitarian roles of cognitive mapping lies a more personal reason for understanding the process by which we come to know the world. In some very fundamental but inexpressible way, our own self-identity is inextricable bound up with knowledge of the spatial environment. Cognitive maps serve as coat-hangers for assorted memories.

Understanding the nature of the image is essential to the healthy growth and development of both the individual and society. The difference between the image and the geographic or contextual environments is a clue to our psyche; a psyche that discriminates and makes decisions often without the realization that these differences exist and often in the belief that no differences exist. "If our behavior towards the environment is indeed based on unexamined values and faulty assumptions, then it should be the business of education to examine these values and challenge the assumptions."

Our objective should not be to discover every place and every difference between the personal and geographic and contextual environments, to know all terra incognita, or to count every detail. Our behavioral environment is not and should not be merely a duplication of the exoteric. Rather we need to learn to see and tolerate the inconsistencies and the unknown. We need to become explorers of our image-space, transforming biases and faulty assumptions. Just as dreams provide "information about the secrets of the inner life and reveal to the dreamer hidden factors of [the] personality so can our images tell us more...

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103 Ibid., p.24.
104 Ibid., p.27.
about where we live and who we are living with and next to. The spiritual teacher Robert Aitken writes: "To cut off the mind road is to experience total silence, so that circumstances can be seen clearly and taken in cleanly, each one fresh and new. Not to cut it off is to continue projecting one's own confused images on the world and then cling to them."

Stepping back and looking at our image, image-space and projections, can help us to live more peacefully with each other and with our environment. The following chapter examines methodologies used by various researchers in their studies of the image and behavioral environment.


Chapter 3

METHODOLOGIES THAT STUDY THE IMAGE

There is no single correct path to understanding and explanation: hence it is impossible to specify an optimal research methodology.\footnote{108}{Downs \& Stea, "Introduction to Image \& Environment," p.6.}

Roger Downs and David Stea

Each of the three environments is studied by many disciplines. The geographic environment is studied by geologists, biologists, geographers.... The contextual environment is studied by anthropologists, sociologists, psychologists.... The personal environment is studied through dream work, psychoanalysis, psychotherapy, psychology.... To understand the problem of studying the behavioral environment we need to understand what methods have been employed thus far.

Methodologies include, but are not limited to, dream work, semantic differential tests, simple descriptions, multidimensional scaling techniques, sketch maps, and behavior studies. Each of these is not without criticism.\footnote{109}{Lynch's work with sketch maps, for instance, has been criticized on a variety of grounds including that the maps do not produce information as well as simple listings, that they are dependent upon graphic or spatial literacy, and that the process itself may be threatening. See Lynch, Image of the City, and Downs and Stea, Maps in Minds, p.222.} After surveying many studies in behavioral geography, Downs and Stea conclude that "there is no generally accepted party line by which we can understand and explain" and "no unified theoretical framework upon which we can
base our understanding of the image. Complicating any study of the image are a multitude of factors. Yi-Fu Tuan cites several;

1. Man has a past; his response to the environment at any time is influenced by the cultural baggage he has accumulated.

2. Man has projects that lie in the future; a student, for example, may be immune not only to the influences of the physical setting (classroom) but to the professor’s deliberate input of stimuli, because his mind is determinedly elsewhere.

3. Man can alter his environment so that it holds a mirror of his power, purpose, and value.

In general, according to Spencer, methodologies can be said to fall into one of three categories. These categories will be used in the following discussion.

1. By inferring the form of the image from overt behavior.

2. By eliciting maps, drawings or descriptions of the environment from subjects.

3. By administrating psychological techniques such as repertory grid, semantic differential, and multidimensional scaling.

Studies in overt behavior

Studying behavior is an indirect way of studying the image. Porteous’ diagram, Figure III-1, uses behavior to elicit the form of the image. Map III-1 is another example
The map is constructed from the movement patterns of an individual over the course of a year. The many sources of information in the environment are listed in Table III-1. This table shows how sources can be both direct and indirect. Map III-2 uses these sources of information to map behavior in the form of "experience bias". Notice the similarities in all of these visual representations of behavior. A cluster

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115 "Sources of information and attraction-avoidance in the urban environment." G. Banz, Elements of Urban Form, quoted by Gold, Behavioral Geography, p.50.

116 This map was made by the author to show the behavior of the Holloway family over a period of 20 years. Notice that the pattern is similar to the maps in the first Chapter. In this case an activity field replaces the information field as the mapped element.
of activity decays outward from a core in one or more directions but not equally in all directions. Movement, rest and encounter, according to David Seamon, describe behavior in the geographic environment.\textsuperscript{117}

Such methodologies are useful but time consuming. With the use of a Global Positioning System locator, studies of movement, rest, and encounter might be more easily done. Home, work, school, shopping and recreation form the framework of our activity in the phenomenal environment but the patterns we have seen cannot be explained merely by the parameters of the geographic environment. "No clear theoretical stance on person/environment relations has been developed beyond a postulated mental interaction

\textsuperscript{117}Most reports [of experiences in the life-space] could be described in terms of movement, rest, and encounter." David Seamon, \textit{A Geography of the Lifeworld: Movement, Rest, and Encounters}, (London: Groom Helm, 1979), p.25.
Sources of information and attraction-avoidance in the urban environment

- Visual
  - Positive: Stimulation (beauty, excitement)
  - Negative: Repulsion (ugliness, chaos)

- Aural
  - Positive: Stimulation (wind rustles leaves)
  - Negative: Confusion (pneumatic drills, car horns)

- Kinetic
  - Positive: Stimulation (solar radiation, textures)
  - Negative: Abrasion

- Olfactory
  - Positive: Stimulation (agreeable smells)
  - Negative: Revulsion (offensive smells)

- Interpersonal
  - Positive: Face-to-face
  - Negative: Confrontation

- Communication
  - Positive: Stimulation through mass media
  - Negative: Distraction

Table III-1 Sources of Information

whereby humans shape the environment and are subsequently shaped by it." Any model must include the influences of the behavioral or personal environment. Consider these lines by Yi-Fu Tuan citing R. G. Barker:

'One person may enter a drugstore to buy medicine for a friend, another may enter to buy poison for an enemy' (Roger Baker). If we observe only the behavior, nothing perhaps distinguished the one from the other. They both make the same gestures appropriate to the drugstore, even though the worlds in their heads are radically different. A problem in the study of the relationship between environment and behavior is that we do not know what is going on in people's heads. What goes on there may have little or nothing to do with the environment of the time and yet have much to do with subsequent action.

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Studies in eliciting maps

Map III-3 are examples of sketch maps, elicited from a subject involved in a study of mental maps made before and after a visit to the Sonoran Desert. Kevin Lynch studied the image through the use of several methodologies that elicited maps, drawings and descriptions from his subjects. Among these were the use of sketch maps and interviews, the second category of Spencer's methodologies. He found that there were five main elements to the cognitive schema. These are listed in Table III-2 and depicted in Figure III-2. Porteous elaborates on the five elements:

The suggestion is that space consists of a number of points embedded in a network of routes (Kaplan), a notion similar to the home-range concept. Several routes connect each point, and pass through other points. Direction involves moving toward or away from specific points, and regions of closely associated points can be identified. From these points, routes, and regions, however, emanates a confusing barrage of stimuli which impinges upon the observer. Thus man needs "a simplified model of the real situation in order to deal with it" (Simon), and a primary function of the brain appears to be the formation of spatial abstractions. The brain is therefore regarded as a selector, shifting the vast input of stimuli and retaining meaningful ones so that the complex overall structure of one's surroundings is simplified into a personal mental map (Carr). According to Lynch "Environmental images are the result of a two-way process between the observer and the 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."  

Studies using psychological techniques

A representation of cognitive distance distortion can be found in Map III-4. The map, based on distance matrices provided by several hundred students, was part of a parking

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121 See Lynch, Image of the City.

122 Lynch, Image of the City, paraphrased by Porteous, Environment and Behavior, pp.102-103.

The experience is based on the records of the Holloway family over a twelve year period. Isolines, showing areas of equal experience, were calculated by weighting presence (X5), sight (X3), and hearing (X2), over areas perceived daily (X10), weekly (X5), and annually (X1). The resulting colour coded pattern is explained below.

A sense of place is drawn from an experience-area, bounded (in this case) by the limits of sight (across the meadow and upstream), sound (in the forested areas), and presence (on the far shore and entrance road areas). The map reflects the second-home nature of the experience; where the family has put its "back" towards the entrance road and "faces" those places with a view.
Map III-3 Sketch Maps: Sonoran Desert study
1. **Paths** are movement channels, such as streets, railroads, transit lines, and walkways.

2. **Edges** are linear elements not used as paths. They include outlines, such as the coast; barriers, such as walls; and "seams" which bind two regions together.

3. **Districts** are regions of the city that are identified by some common character, and which the individual can enter.

4. **Nodes** are frequently focal points where paths meet, as at intersections or transportation junctions. Or they may be places where there is a concentration of activity, as in squares or street corners...Nodes may be entered.

5. **Landmarks** cannot be entered, they are external reference points which are distinguished in some way from a host of other possible landmarks....Or even outside the city (mountains)....

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<th>Table III-2 Elements of the Mental Map</th>
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...study conducted in 1986-1987 at the University of Montana.\(^{124}\) The grid shows how the geographic environment was collectively distorted.\(^{125}\) Areas of little or no distortion appear on the map as most nearly perfect squares. This is an example of one of the many methodologies using psychological techniques. Although the grid in Map III-4 shows distortion, it is not clear what is the nature of this distortion. Space is not absolute. Rush hour space and play space are not experienced the same to us. This is true not only because of the time element in moving through such a space-time continuum, but also because of our


Figure III-2 Main Elements of the Mental Map

destinations. "Experience takes time...to know a place is also to know the past." Our perception of distances and our image-space is based on this space-time continuum. Areas may be omitted, distances and directions distorted and the world simplified, symbolized and embellished.

Multidimensional scaling "...is a technique that is designed to construct a 'map' showing the relationship between a number of objects, given only a table of distances between them." Map III-4 was made using such a technique. The method, according to Butterfield, uses

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127 Leff, Experience, p.193.
Map III-4 Distortions of Geographic Space

...an iterative process of producing coordinate positions for a set of point features to closely approximate a matrix of input distances between those features. The input matrix may contain metric or non-metric (ranked) distances. The solution may place coordinates in one, two or more dimensions. For cognitive mapping problems, two-dimensional coordinates are most often constrained...one assumes that all point features are equally familiar to each individual.\textsuperscript{129}

Butterfield compared maps produced using multidimensional scaling techniques, such as Map III-4, and sketch maps, such as Map III-3. She concludes that:

...on the average MDS [multidimensional scaling] configurations produce large scale cognitive maps which more clearly resemble planimetry, although extreme errors in reported location tend to occur

\textsuperscript{129}Barbara P. Butterfield, "Comparing Distortion on Sketch Maps and MDS Configurations," \textit{The Professional Geographer} 38:3 (August 1986):239.
more often with this technique. The sketch mapping techniques provide a more consistent response when spatial information is elicited from a group of subjects.\textsuperscript{130}

There is evidence that "people tend to overestimate the size of especially liked areas in liked environments and of especially disliked areas in disliked environments."\textsuperscript{131} A study by Lundberg looked at the relationship between emotional involvement and subjective distance. It examined the premise that we are much less affected emotionally by events taking place at a great distance, than by what happens close by."\textsuperscript{132} Figure III-3 shows the results of his work graphically.\textsuperscript{133} We are more aware, more involved, and more affected by nearby places. The intensity of emotional involvement decreases "according to the square root of the increasing subjective distance".\textsuperscript{134}

Intensity is something that is unique to the individual. My home will be a more intense experience for me than it will be for a stranger. Likewise those places which play a key role in my life will be more intensity experienced than those which I experience on the periphery. The concept of intensity is not unlike that of population size for the economic geographer. Cities with large populations have a greater attraction and exert a greater influence than do cities with small populations.

\textsuperscript{130}Ibid., p.245. Butterfield goes on to mention that this conclusion is contradicted by other researchers.

\textsuperscript{131}LefF, Experience, pp.193-194.

\textsuperscript{132}Ulf Lundberg, "Emotional Geographical Phenomena in Psychophysical Research," in Image and Environment, eds. R. Downs and D. Stea, (Chicago:Aldine, 1973), p.323. "When subjective distance was plotted as a function of real geographic distance, the relation was describable by a simple power function where $a$ is subjective distance, $D$ is physical space, $a$ is the empirically found exponent of the function determining the curvature, and $n$ is introduced to account for the arbitrary unit of measurement." $n$ was found to be most often less than one, "indicating a negatively accelerated trend." Ibid., p.323. See also John Lowe and Eldor Pederson, Human Geography: An Integrated Approach, (New York: John Wiley and Sons, 1983), pp.27-28.


\textsuperscript{134}Ibid., p.323, citing Ekman and Bratfish, "Subjective distance."
Leff notes that while the predominate use of psychological techniques has been to test location, "questions about the role of affective response and social meaning have been relatively neglected." He goes on to note that "far too little attention has been given to the affective or emotional side of life..." Studies in location support the model of the image as having a topological structure or "invariance with respect to reality. The "map" might be stretched and twisted relative to the actual city form, but [is] "rarely torn and sewn back together in another order".

Another psychological method is the semantic differential technique. Semantic differential is a "... technique due to Charles Osgood and his co-workers for evaluating the

\[ y_x = \frac{b}{\sqrt{x}} \]

Figure III-3 Emotional Involvement

\[ y_x = \frac{b}{\sqrt{x}} \]
connotative meanings of individual words."\textsuperscript{137} Using a semantic differential questionnaire the researcher can elicit how an individual feels about places, people, and things.

The "semantic differential" is essentially a rating technique whereby something is evaluated on a number of short rating scales, each labeled or "anchored" by a bipolar adjective pair (for example, "good:____:____:____:____:bad"). This technique has been used in a wide range of psychological research, and regardless of what is being rated (people, words, environments, and so on), three dimensions tend to underlie the ratings: an evaluative factor (good-bad), a potency factor (strong-weak), and an activity factor (active-passive)...\textsuperscript{138}

Studies using scaling techniques reinforce the conclusion that relationships in the image are first and foremost personal, not geographic.\textsuperscript{139} Nearby places and areas (i.e. areas in the core area of the image-space) are subject to greater discrimination than places far away (i.e. places in the field area, islands or at the limits of the information field). Cox describes this phenomena as the spatial discrimination effect.\textsuperscript{140} Peter Gould and Rodney White studied locational preferences, distance distortions, and place knowledge extensively. Their conclusion, illustrated in Figure III-4, is simple:\textsuperscript{141}

From this very simple analysis, using our crude surrogate measures of information, we can now postulate an intriguing idea: the average person's information about geographic space is virtually determined by his location within an invisible, but very real information environment.

\[ \text{Information} = \frac{1}{[\text{Population}, \text{Distance}]} \textsuperscript{42} \]

\textsuperscript{137}Reber, Dictionary of Psychology, p.681.

\textsuperscript{138}Leff, Experience, p.206.


\textsuperscript{140}Cox, Man, Location, and Behavior, p.115.

\textsuperscript{141}"The quantity of information generated by places varying with the size of the places, and the distance they are from the perception point." Gould & White, Mental Maps, p.132.

\textsuperscript{142}Ibid., pp.132-133.
The quantity of information generated by places varying with the size of the places, and the distance they are from the perception point.

**Figure III-4** Distance, Size and Information Quantity

The psychological technique of free-association was developed by Freud and his followers. The method involves any "unconstrained association made between ideas, words, thoughts, etc."\(^{143}\) Amplification or controlled association was developed by Jung, Adler, and others from free-association. In this method the association is based on a central image or images as in a dream. The projective method enables an exploration of the personal

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\(^{143}\)Reber, *Dictionary of Psychology*, p.58.
environment indirectly, without the individual filtering and editing the content. Here, Jung talks about the methodology:

Even tho dreams refer to a definite attitude of consciousness and a definite psychic situation, their roots lie deep in the unfathomable dark recesses of the conscious mind. For want of a more descriptive term we call this unknown background the unconscious. We do not know its nature in and for itself, but we observe certain effects from whose qualities we venture certain conclusions in regard to the nature of the unconscious psyche. Because dreams are the most common and most normal expression of the unconscious psyche, they provide the bulk of the material for its investigation. Since the meaning of most dreams is not in accord with the tendencies of the conscious mind but shows peculiar deviations, we must assume that the unconscious, the matrix of dreams, has an independent function. This is what I call the autonomy of the unconscious.

The individual amplifies the contents of the dream enabling "one to put one's finger on the patient's complexes." Again Jung and Adler comment on this method of analysis:

It [a logical principle which is called amplification] is simply that of seeking the parallels...know what tissue the...image is embedded in. That is amplification. It is a well-known logical procedure which we apply here and which formulates exactly the technique of finding the context.

The collection of additional material proceeds according to the same principle of recollection, which has also been called the method of free-association. The result, as can be readily understood, is an accumulation of very diverse and largely heterogeneous material, having apparently nothing in common but the fact of its evident associative connection with the dream-content, otherwise it could never have been reproduced by means of this content.

...whereas psychoanalysis proceeds by means of free-association, Analytical Psychology works with a kind of controlled or "circular" association for the purpose of amplifying each element in a dream....Instead of a chain of associations proceeding in a straight line...this "controlled" association executes as it were a circling movement round the various components of a dream. Thus one never loses sight of the dream. This kind of association is, as Jung has put it, like "a search-light carefully and consciously directed on those associations which are grouped round the keyword of the dream."

---

144 Ibid., p. 58.
146 Adler, *Studies*, p. 45.
147 Jung, *Analytical Psychology*, pp. 92-93.
This method of *controlled association* or *amplification* comes the closest to enabling the researcher to look at the image as whole, without the subject being intimidated or selectively editing the contents to please the researcher. Map 1-1, on page 3, is an example of information obtained through the usage of a controlled association technique. For this reason, and because of its successes in psychoanalysis in many variations, it will be used for the purposes of this study. Two other methods, *semantic differential* and *multidimensional scaling* will also be used. Together, the methods address the three aspects to this study suggested at the start of Chapter Two. Their application to this study is discussed in detail in Chapter Five.
Chapter 4

THE PROBLEM

The concept of the image has been developed from several standpoints. The relationship between the three environments (the geographic, contextual and personal) and the image has been discussed. The idea of the behavioral environment as both space and image has been postulated as a way of explaining behavior. These concepts, proposed by geographers, psychologists and others, show that behavior is a function of our image. Distance decay theories are used to explain the emotional and physical contents of the cognitive schema. The schema has a basic geometry that is non-Euclidean, probably topological, while still retaining a similarity to the geographic environment. Projection of the unconscious self onto the exoteric environment(s) defines a behavioral environment unique to each individual. Affects, memories and future plans, although little understood, are also acknowledged as important parts of the image.

While studies of the image have been done from a variety of disciplines and with a multitude of methodologies few, if any, have looked at the image as a gestalt or addressed the affects imbedded within it. This study develops a methodology to externalize a picture of the image that is multidimensional, expressing elements from the contextual, geographic and personal environments.150

150"The problem becomes one of externalizing the image from the mind of the subject." Porteous, Environment and Behavior, p.114.
Studies have been done that analyze mental maps. Few, however, consider the spatial pattern of the elements in the information field in terms of orientation. This study asks the question: Where are the elements of the image, located, and why are they located there? An effort is made to consider the image on its own terms, a sort of topoanalysis, much as a psychoanalyst considers the elements of a dream. Whereas a psychoanalytical treatment of the image distinguishes the methodology and interpretation, a geographic treatment distinguishes the analysis of these findings.

Consider the description, maps, terms and discussion in Chapter I. Why did my description, when mapped, display such a distinctive pattern; core area, field area, islands, empty-space and orientation? What are the affects I associate with these areas? Did I display prejudice to certain areas? Will the image-spaces of others display similar asymmetric patterns, associated affects and orientation? Is my image-space best expressed in topological, non-Euclidean space? Reflecting on questions similar to these suggests three aspects to the problem in this study. These are:

1. Developing a methodology to externalize the gestalt of the image.

2. Testing the hypothesis that the image has orientation bias resulting in two significantly different regions; the information field region with core area, field area and possible islands, and the empty-space region.

3. Testing the hypothesis that these regions are related to distinctly different affects and organizations of geographic space.

The primary hypothesis states that the image will display a pattern showing directional bias. An information region, with a core field and island areas, can be defined based on the decay of information outward from a center. Directional bias will define an
empty-space region which is, in itself, not terribly significant. However, should certain affects and organizations of space be shown to be associated with these regions we will have a better understanding of human behavior and the human condition.

It is hypothesized that affects and the organization of geographic space will show the following patterns and associations:

1. Geographic space in the core area will be organized with the least amount of distortion while being slightly expanded. The core area will show a greater number of responses and complexity. While there will be an overall tendency to approach or like places in the core area, there will be places which are disliked and avoided.

2. The field area will show more neutrality on the like-dislike or approach-avoid evaluative scale. There will be a tendency to like the area but not to the same degree as with the core area. The field area will be less complex, and geographic space more distorted than in the core area.

3. Islands will be liked and one dimensional, and geographic space between island and core contracted. Islands will show a tendency to appear in either the primary or secondary directions of orientation from the center.

4. The empty-space region will be disliked and avoided. The space will show little complexity. Geographic space in the empty-space region will be contracted.

The above hypothesis are based upon common sense. We tend to like the places we visit, live in and with, shop at, work, etc. If we do not, or when we cease to, we alter our behavior, friends, residency, change our job, or move. Places we avoid and dislike are places we tend not to visit or recall; they are not a part of our constellated image. We will know more about places that are close by: these are the places that play the greatest role and the most importance in our lives. Our sense of space will vary in accuracy from place to place.
in the geographic environment. There is nothing unusual about these assumptions. What
is of interest is that these assumptions, stated in the above hypotheses, may form patterns that
repeat themselves among individuals, and if so, these patterns can be used to explain behavior
and understand the personal environment or our psyche.

The goal of this study is to see if these places, affects and perceptions of space create
predictable patterns. If they do, then we ask ourselves why, and examine the significance of
the patterns on our behavior and the environment. For instance, I may like the area
surrounding my office and in the direction of my bias, northwest (see Map I-3 on page 19); I
may dislike the empty-space to the southeast. This being the case how will my behavior
be affected should I be asked to evaluate a petition for zoning exemption in my empty-space,
or in my core area? My expected rational behavior may be influenced unknowingly by the
nature of the space and image of my behavior environment. A strong case has been made
for the existence of, and the influence of, the behavioral environment. It will affect not only
my work but my entire life. This study tries to evaluate the behavioral environment in such
a manner as to see if indeed these hypotheses may be true. If they are not, we may have to
reevaluate the assumptions and reshape the hypotheses.

Chapter V will detail methodologies and studies conducted with a sample population
of sixteen individuals. The first or primary study uses a controlled association (or
amplification) technique to elicit a picture of the image in much the same way as a dreams
are studied. The second uses multi-dimensional scaling techniques to determine spatial
distortions of geographic space. The third study uses a semantic differential questionnaire
to determine what affects are associated with the areas and features found in the first study.
Chapter 5

ORGANIZATION, METHODOLOGY AND INLYMAPS

Organization

Before this study was undertaken, a variety of methods derived from each of the three principle methodologies (overt behavior, eliciting maps and psychological methods) described in Chapter II, were tested and evaluated for their effectiveness in understanding the behavioral environment. The methods that were tested include studies the results of which are depicted in Map III-2, Map III-3 and Map III-4 (see pages 47, 48 and 51). In addition to these studies: a multidimensional scaling technique was used to evaluate distance matrices of twelve western cities for a group of college students, Lynch-style maps were constructed for a group of third graders\textsuperscript{151}, and an analysis was done on the spatial elements appearing in a dream series. Although none of these research projects form a part of this study per se each contributed to the eventual conclusion that the hypotheses warrant further testing, and that the best methods to conduct this testing are likely to be psychological ones.\textsuperscript{152}

Methods that rely on an individual's ability to think and express himself spatially (eliciting sketch maps) are not selected because they rely on skills that not all individuals possess and because of the unfamiliarity many people have with the act of drawing. Methods that rely on studying overt behavior are not selected because these do not provide a clear

\textsuperscript{151}See Lynch, \textit{Image of the City}.

\textsuperscript{152}Psychological methods are discussed on page 46.
indication of the affects in the image. Methods from both of these categories could, however provide important corollary studies. Three psychological methods are selected to test the primary hypothesis (see page 59) that the image will show a pattern of directional bias with an empty-space region, and the remaining hypotheses (also page 60) that certain affects and organizations of space will be associated with certain parts of the image.

It is important that subjects feel free to express themselves, and that they do not bias their expression for the researcher. This is especially important in dealing with psychological materials which contain both pleasant and unpleasant associations. No one method completely satisfies the research demands of this study because of the complexities of the psyche. Three standardized methods are adapted for use in this study. These psychological methods are similar to those discussed in Chapter III (see page 46). Since the primary goal of this thesis is to develop a methodology that will externalize of picture of the image as a whole (see page 59), and allow for an evaluation of its contents and spatial structure, these three tests are all modified and tailored, some more than others, for this thesis.

The method of controlled association, which is often used in dream work, is selected as the primary methodology. Two additional tests are selected to compliment the primary one. The three tests are: 1) a controlled association test to elicit the spatial elements of the image 2) a multidimensional scaling test to determine distortion of geographic space and 3) a semantic differential test to study affects. Three questionnaires, answered in two separate sessions over the course of several weeks are completed by a sample population called subjects. Each questionnaire is designed for evaluation by one of the three above mentioned tests.
Together they are designed to produce a picture of the image as a whole or gestalt, that in turn can be used to test the hypothesis.

The controlled association test is used as the primary methodology. A discussion of traditional uses of this test occurs on page 55. The test is adapted from dream analysis. One might, in a dream, experience a fence. A typical usage of the controlled association method would be to allow the image of the dream-fence to stimulate the imagination and memory. Associated affects and images are freely recalled. In this study, instead of using an image from a dream as the starting point, the weekly and daily experience of the neighborhood-city is used to stimulate the image. The neighborhood-city scale is selected because it is a "salient experience", not "a vague, shifting experience, but something that [is] quickly and easily acknowledged and fairly readily described...."\textsuperscript{153} The test is referred to as the image-space study because it deals with the space and the image of the behavioral environment. Although the hypothesis states that there will be a directional bias to the contents of the image, it is not bound to a particular scale. The neighborhood-city scale is selected because, it is felt, it will provide the best scale for testing. The opening description in Chapter I reflects a modified usage of the controlled association technique, and the information obtained from it (see Map I-1, page 3), indicates how the information will be utilized in this study.

\textbf{Multidimensional scaling} tests have been used with varying degrees of success to construct maps showing how individuals perceive distances. The method is discussed in greater length on page 50. For the purposes of this study the test is applied to a distance

\textsuperscript{153}Lee, "Living Space," p.91.
matrix supplied from a series of questions about relative distances between known places in the Missoula Valley. The test, conducted for reasons outlined in Chapter II, is referred to as the distance-perception study because it examines perceptions of distance. Places in the Missoula Valley, occupying a similar scale as those from the image-space study, are selected for comparison in this test.

From the information obtained in these studies (image-space and distance-perception) two sets of maps for each individual are produced. The first set is similar to Map 1-2 and Map 1-3 (see pages 17 and 19). This set of maps defines a core, field and island areas in the information field region, and an empty-space region. The second set of maps shows where geographic space is contracted or expanded, and the degree to the distortion of space.

These results are used with a semantic differential test, to gain a sense for the affects associated with the neighborhood-city. The semantic differential test, discussed on page 53, is traditionally used with words and objects. For the purposes of this study it is applied to places. The test asks a series of association questions to determine if the individual "likes or dislikes" a place, feels it is "fast or slow", or if they "approach or avoid" it. The test is referred to as the affect study because it is concerned primarily with affects.

Subjects are asked to complete each of the first two tests in a single uninterrupted sitting, and to complete the third test in the same physical location as the first two. They are asked to take the tests either at home or at work; places where they spend considerable time. The discussion which follows focuses on each of the three tests always asking the question; where is it located? In the case of the image-space study this refers to the elements of the image. For the distance-perception study it refers to the location of distortions of
geographic space. In the affect study associated affects are located in reference to the image-space. Individual results from the three tests can be found in Appendices B, C and D. From this information the inlymaps, which appear at the end of this chapter, are made. The discussion in Chapter VI uses the inlymaps to address the question as to why the image has the spatial structure that is does.

Population and study area

The primary intent of this thesis is to test a way in which the image can be studied as a whole. To do this, three psychological tests are applied in such a way that their results can be compared and mapped. The tests are designed to study the image in space. Because the attempt is not to draw conclusions about a population or group of individuals, a small sample size (thirty-two) is selected from individuals who reside in one common community. Each of the thirty-two subjects lives or works near the downtown-university area of Missoula, Montana, is between 30 and 50 years of age, and is unaware of the purposes of the study. Sixteen complete in usable form all three studies within the time parameters allowed. Subjects are equally divided between male and female. A host of demographic data are collected. Some of the more revellent are displayed in Table V-1. None of the data, however, are found to have any bearing on the patterns of core, field and empty-space or affects in so far as a simple analysis is able to determine. The number of years residency in Missoula varies from four to 33 years while the number of trips outside the country ranges from zero to 40. It is speculated that residency time and travel experience might visibly relate to patterns on the maps.
<table>
<thead>
<tr>
<th>Subject</th>
<th>Age</th>
<th>Sex</th>
<th>Years in Missoula</th>
<th>Trips Outside USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>41</td>
<td>M</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>71</td>
<td>M</td>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>33</td>
<td>M</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>31</td>
<td>F</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>51</td>
<td>M</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>F</td>
<td>33</td>
<td>M</td>
<td>33</td>
<td>4</td>
</tr>
<tr>
<td>G</td>
<td>41</td>
<td>F</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>H</td>
<td>40</td>
<td>F</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>I</td>
<td>41</td>
<td>F</td>
<td>26</td>
<td>10</td>
</tr>
<tr>
<td>J</td>
<td>31</td>
<td>F</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>K</td>
<td>39</td>
<td>F</td>
<td>21</td>
<td>40</td>
</tr>
<tr>
<td>L</td>
<td>36</td>
<td>F</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>M</td>
<td>42</td>
<td>M</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>N</td>
<td>35</td>
<td>F</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>O</td>
<td>35</td>
<td>M</td>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td>P</td>
<td>40</td>
<td>M</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>MEAN</td>
<td>40</td>
<td></td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>MEDIAN</td>
<td>39</td>
<td></td>
<td>18</td>
<td>4</td>
</tr>
</tbody>
</table>

Table V-1 Demographics of the sample

The controlled association test is designed to stimulate the image that is associated with a neighborhood-city. The wording of this test is discussed in greater detail later in the next section. Although the resulting scale of neighborhood-city varies some from individual to individual, a defined study area is needed to facilitate the analysis. Based on the results from pretesting, an area twelve miles in diameter from the population mean center of town
This area is shown in Map V-1 at a scale of 1:225000. The second map shows key features in the geographic environment (rivers, highways, and mountains) that appear on the inlymaps. All of the maps appearing in Chapters V and VI, and Appendices C, D & E use this map as a base, and all are shown at the same scale with the same orientation. The size of the area in itself is insignificant. It simply serves the purposes of this study in providing a base where 95% of all responses from the image-space study can be located with reasonable accuracy. Any place within, visible from, or audible from this area is considered within the "neighborhood-city" parameters of the study.

**Primary methodology: image-space study**

Thirty-two subjects are asked to complete a controlled association questionnaire designed to elicit a sample of the spatial elements of the image. The questionnaire, located in Appendix B, is based on set of instructions provided in both written form on the questionnaire, and verbally when passing out the test. The instructions, in Figure V-1, may appear to overly lead or direct the association with the neighborhood-city. However, from pretests with simpler and less complete instructions, individuals appeared to need this direction. Ideally the information would be gleaned from a series of topoanalysis sessions with the individual talking about the place and places with which he lives on a more or less daily or weekly basis. This not being possible the instructions shown in Figure V-1 are used to elicit the information field.

---

154 Missoula, MT, with a population of roughly 50,000. The center is located at Russell and West 6th.

155 Places were located and mapped at a scale of 1:24000.
Base Map
Missoula, MT
1:225,000

Features Identified on Maps
Roads
Rivers
Mountains

Map V-1 Study area and key features
This survey gathers information on the place and places with which you live with on a more or less daily and weekly basis. Because most of us live in the Missoula valley, Missoula itself will likely contain most or all of these places. The survey asks you to list the places that come to mind when thinking about this area. Whatever comes to your mind is an appropriate answer.

Please list on the following pages the first 30 places that come to your mind. There are no right or wrong answers. A place can be equally a house, field, building, road, facility, business, or river. Briefly describe the place in such a way that it can be located on a map. Include a word or phrase to indicate your relationship to the place (i.e. Where I watch baseball).

Let your mind wander. Do not limit yourself to places within the city of Missoula but do limit yourself to those places with which you interact, through any of your senses, on a more or less daily or weekly basis.

Figure V-1 Image-space study: instructions

The test asks for a list thirty places. The first 20 responses from the completed questionnaire for subject I are reproduced in Table V-2. Not everyone was able to complete a list of thirty places either visible, audible, or within the Missoula Valley. Some responses were difficult to locate (i.e. on the bus), some were outside the study area (i.e. my mother in Florida), and some were not in geographic space (i.e. KUFM radio station music). Only those questionnaires with 24 usable responses are used.\textsuperscript{156}

From this information simple maps are made showing the location of the responses. These responses form the basis for what will be referred to as the information field. Maps for all of the subjects appear in Appendix B. Map V-2 shows the combined information fields for all 25 subjects. The responses are classified by type: personal, corridor, region, center or landmark. A size for the information field, a nearest neighbor index, and several other analysis are calculated. Table V-3 shows the results from this analysis for the sample

\textsuperscript{156}Twenty-five questionnaires were usable for further analysis. Of these, 16 completed all three tests in usable form.
<table>
<thead>
<tr>
<th>Point</th>
<th>Place</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>(The &quot;M&quot;)</td>
<td>Mt. Sentinel</td>
<td>the view from my office window</td>
</tr>
<tr>
<td>2.</td>
<td>My office</td>
<td>210 North Higgins</td>
<td>where I work</td>
</tr>
<tr>
<td>3.</td>
<td>Home</td>
<td>931 Wolf</td>
<td>where I live</td>
</tr>
<tr>
<td>4.</td>
<td>Van Buren Bridge</td>
<td>Front &amp; Van Buren</td>
<td>I walk across to class</td>
</tr>
<tr>
<td>5.</td>
<td>Clark Fork River</td>
<td>east of footbridge</td>
<td>view from bridge</td>
</tr>
<tr>
<td>6.</td>
<td>Goldsmith's</td>
<td>821(?) E. Front</td>
<td>pick up daughter &amp; go in for ice cream</td>
</tr>
<tr>
<td>7.</td>
<td>I-90</td>
<td>between Madison &amp; Orange exits</td>
<td>I drive to and from grocery store &amp; club</td>
</tr>
<tr>
<td>8.</td>
<td>Msla Athletic Club</td>
<td>East Broadway</td>
<td>where I swim</td>
</tr>
<tr>
<td>9.</td>
<td>Grizzly pool</td>
<td>Campus</td>
<td>where I swim on Sundays</td>
</tr>
<tr>
<td>10.</td>
<td>UM-Business Bldg</td>
<td>Campus</td>
<td>where I go to class</td>
</tr>
<tr>
<td>11.</td>
<td>Greenough Park</td>
<td>lower Rattlesnake</td>
<td>where I walk &amp; bicycle</td>
</tr>
<tr>
<td>12.</td>
<td>Buttrey's</td>
<td>East Broadway</td>
<td>where I buy my groceries</td>
</tr>
<tr>
<td>13.</td>
<td>Hellgate High School</td>
<td>800 S Higgins</td>
<td>where I drop Jada off to school 3x week</td>
</tr>
<tr>
<td>14.</td>
<td>Bus stop</td>
<td>Broadway &amp; Pattee</td>
<td>where I catch the bus home</td>
</tr>
<tr>
<td>15.</td>
<td>Bus stop</td>
<td>Wolf &amp; North 3rd</td>
<td>where I catch the bus to work</td>
</tr>
<tr>
<td>16.</td>
<td>Good Food store</td>
<td>Kensington &amp; Stephens</td>
<td>where I buy my groceries</td>
</tr>
<tr>
<td>17.</td>
<td>1st Interstate Bank</td>
<td>101 East Front</td>
<td>where I bank</td>
</tr>
<tr>
<td>18.</td>
<td>Hellgate Football Field</td>
<td>south of river between Madison &amp; Higgins</td>
<td>the view I see from Madison St bridge</td>
</tr>
<tr>
<td>19.</td>
<td>(Stewart Peak)</td>
<td>Rattlesnake Wilderness</td>
<td>view from Madison St bridge</td>
</tr>
<tr>
<td>20.</td>
<td>Mammyth</td>
<td>130(?) West Main</td>
<td>where I often eat lunch</td>
</tr>
</tbody>
</table>

Table V-2 Image-space study: responses (1)
Map V-2 Image-space study: information fields (all)

as a whole. This table gives the results for the 25 usable tests from this study. Table V-4 shows selected information for the 16 subjects who completed all three of the tests. Most of the responses, 63%, were directly experienced centers of some type (i.e. home, office, store
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEAN</th>
<th>MEDIAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>40.0</td>
<td>39.5</td>
</tr>
<tr>
<td>Number of years lived in Missoula Valley</td>
<td>16.0</td>
<td>13.5</td>
</tr>
<tr>
<td>Number of trips outside the USA</td>
<td>7.7</td>
<td>4.0</td>
</tr>
<tr>
<td>Number of points outside the study area</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>First mention of home</td>
<td>3rd</td>
<td>1st</td>
</tr>
<tr>
<td>Square miles of standard deviational ellipse</td>
<td>20.2</td>
<td>12.7</td>
</tr>
<tr>
<td>Ratio of long to short axis of standard deviational ellipse</td>
<td>1: 2.7</td>
<td>1: 2.3</td>
</tr>
<tr>
<td>Percent of image-space without points</td>
<td>46.7%</td>
<td>41.6%</td>
</tr>
<tr>
<td>Ratio of number of points in the wedge #1 to the expected number of points(4)</td>
<td>1.8: 1</td>
<td>1.8: 1</td>
</tr>
<tr>
<td>Percent of points in innermost circular quartile of information field</td>
<td>70%</td>
<td>69%</td>
</tr>
<tr>
<td>Nearest neighbor index</td>
<td>.39</td>
<td>.38</td>
</tr>
<tr>
<td>(concentrated to clustered)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean distance deviation in square miles</td>
<td>1.28</td>
<td>1.17</td>
</tr>
<tr>
<td>Ratio of built to natural points</td>
<td>7.4: 1</td>
<td>5.0: 1</td>
</tr>
<tr>
<td>Ratio of directly to indirectly experienced points</td>
<td>12.8: 1</td>
<td>11.0: 1</td>
</tr>
<tr>
<td>Predominate type of point selected</td>
<td>Centers (63%)</td>
<td>(Personal, Corridor, Region, Center or Landmark)</td>
</tr>
</tbody>
</table>

Table V-3 Image-space study: summary for all subjects
<table>
<thead>
<tr>
<th>Subject</th>
<th>% Points Indirect</th>
<th>Image-Space Size (sq miles)</th>
<th>Mean Distance Deviation (miles)</th>
<th>Nearest Neighbor Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4</td>
<td>41.7</td>
<td>0.87</td>
<td>.34</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
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Table V-4: Image-space study: sample summary

or friend’s house). An overwhelming number (half) of participants mentioned their home first. One indirectly experienced place (i.e. Stewart Peak), on the average, fell outside the base map. Responses reflecting built elements of the geographic environment outnumbered natural elements by a factor of 7.4 to 1. The immediate city-scape clearly dominates the contents of the information field. This is not to say that people are unaware

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157 Directly experienced places are places like work, home, recreation sites and shopping centers while places like Stewart or Squaw Peaks are examples of indirectly experienced places.
of the natural environment, as most made sure that a mountain or view was included in the list of responses.

The information field contains 24 responses in the form of point data, a sampling of the information contained within the image. The assumption is made that this sample accurately reflects the contents of the image as a whole for the neighborhood-city.\textsuperscript{158} Because the 24 responses are only a small sample of the image's total contents, a running mean technique is used to build a "picture" of the totality of contents. The procedure is a statistical one which allows the researcher to fill in the gaps between responses. The running mean or average is calculated in this study by determining the number of responses to be found within a given radius from each point in the study area.\textsuperscript{159} No numerical importance is given to the calculations; the running mean is used simply as a measure of transforming the sample of 24 responses into a map showing the relative densities that can be expected for the contents of the image for each subject. A mini topoanalysis, where the subject speaks freely about \textit{the place and places with which they live}, is conducted with several subjects to determine if the running mean field is an accurate reflection of the image. Changes to the core, field and island areas were insignificant. The picture or map (see Map V-3) is an indication of the probability any one section of the study area will contain

\textsuperscript{158}The sample will not really reflect the contents of the entire image; only that part which the key phrase of association has highlighted. An assumption is made that this phrase highlights a similar part of each subject's image. Furthermore, it is not the entire part of the image that is being sampled but rather only "those parts which are momentarily constellated." See Jung, \textit{Psychological Types}, pp.442-443.

\textsuperscript{159}Sharp irregularities between sample collections are smoothed out by calculating running means. This is often done in time series, where there may be missing years, or fluctuations in the data. The data, for example, may be smoothed out by calculating a five year average either side of a year for each year. Any number of years may be used but the number should not be so great as to hide fluctuations of the same length as the running mean itself. In calculating the running mean for the image-space the radius (instead of years) was limited in size. Had a radius equal to the 6 mile radius of the study area been used then the entire study area would have approached the same value (24). By limiting the radius a variation in the relative densities of data are obtained. See S. Gregory, \textit{Statistical Methods and the Geographer}, second edition (London: Longmans, 1968), p.241-243.
information from the image. Darker areas indicate a higher concentration of information or a greater probability, while lighter areas indicate areas of less information. Clearly, one’s home will contain a near infinite number of responses. The darker region in the center of the map helps to define a core area to the field. Isolated areas are considered islands, while

Map V-3 Image-space study: running average (A)
the remaining area is considered a part of the field area. Map V-4 shows this running mean field for subject D in a perspective format.

The center of the information field is defined in this study by the center of minimum aggregate travel. This is calculated from the 24 responses using an iterative algorithm. The center of minimum travel is the "location from which the sum of the distances to all responses in a distribution is a minimum." The location must be found by trial and error. A computer program is written to search for the location. Distances from each point in the study area (accurate to within two decimal places at 1:24,000) to the 24 responses are calculated until a minimum is found. This statistical measure is used as the indicator of the center because it is the place nearest the center of all other places. It is the spatial equivalent of the median. The spatial mean is biased as a result of outlying islands, and is not always located within the core, as is the minimum aggregate travel center. This was clearly the case on Map I-1 (see page 3) where Stewart Peak and Council Grove, responses off the base map, biased the center.

Map V-5 shows the center with desire lines to the 24 responses for subject I. Similar maps for the remaining 16 subjects can be found in Appendix B. Desire lines are drawn between a point of origin and a point of destination. In this case the origin point is the center of minimum aggregate travel and the destination point is the response from the image-space study.

The running mean and the center of minimum aggregate travel are used to define the image-space: an area of equal distance in geographic space from the center, and which

Map V-4 Image-space study: perspective view (D)

contains most all of the information in the image. A circle is drawn from the center, with a radius which includes the elements of the field in the running mean but not island areas. This circle is shown on Map V-5. The area contains both the information field and what will be defined as the empty-space region: an area of the image-space lacking responses as indicated by the running mean, and roughly equal in size to the field area. The size of the image-space, indicated in the third column of Table V-4, varies between 20 and 155 square miles, with a mean of 32.5 square miles. The empty-space region occupies between 32% and 56%, or an average of 44%, of the image-space.
The mean distance deviation of elements in the information field averages one and one-fourth miles; that is, half of all responses are located within one and one-fourth miles of the center. These values are listed in column 4 of Table V-4 for the 16 subjects. The standard deviational ellipse is calculated for each subject and found to occupy a median of 12.7 square miles. As an indication of the shape to the information field, the ratio between the long and short axis of the ellipse is calculated and found to average 2.7: 1.

Since we are interested in the dispersion of the responses, and in calculating a core, field and empty-space, several additional analysis are made. Nearest neighbor indices are calculated and found to vary between .18 to .69. These values, found in column 5 of Table V-4 for the 16 subjects, average .39 for all 25 subjects, indicating that the information fields are clustered (0) to random (1). Figure V-2 shows the distance decay of responses from the center. Responses are ranked by their proximity to the median center. The figure shows these distances for each of the 25 information fields. The nearest responses are within 1000 yards. Ten of all 24 responses can be found from within 600 to 2,100 yards of the center, with most occurring at around 1,000 yards from the center. A curve has been drawn on Figure V-2 to indicate the best fit for all subjects. It shows a typical pattern of decay where the number of responses is inversely related to the square of the distance. Distance plays a key role in the spatial structure of the information field.

Intensity, discussed in both Chapters I and III (see page 52), is a concept used to acknowledge that certain places contain a greater emotional content, more memories, or more meaning than do other places. The intensity of the region, corridor, personal place or landmark will also affect the field. Places that exert a greater intensity on the individual
Information Field & "Cognitive Center"

Places

Desire Lines

Location of HOME WORK

Regions & Areas

INFORMATION FIELD
REGION
• Core Area
• Field Area
• Islands

EMPTY-SPACE REGION

Map V-5 Image-space study: subject I
Figure V-2 Image-space study: distance decay

(home, work, shopping centers, etc.) may appear more frequently and in slightly different form than those whose intensity is less. This is a difficult factor to measure directly from the responses in this study. The degree of intensity is probably better measured by studies that study overt behavior, such as the one shown in Map III-1 (see page 44).
A complete linkage cluster analysis is performed to aid in the process of defining the core (see Figure V-3). In some cases this showed where a clear grouping or clustering occurred, and thus aided in defining which responses to include in the core area. In addition, a point order map is made (see Map V-6). This map shows spatially the order in which responses were made during the test. After a response in the field or island areas a return is often made to the core area, as if the subject were orienting himself.

The primary goal of the image-space test is to determine if there is a directional bias to the dispersion of responses, as was the case in Map I-3 (page 19). To do this the information field is split into six wedges of 60° each, and the number of responses falling within each wedge tabulated. Table V-5 shows the results from this count. Wedge 1 is defined to contain the most number of responses. The table indicates where the number of responses for each wedge is either greater or less than the expected number of responses as would be the case for an equally dispersed field. In 11 of 16 cases, wedges with the lowest values, border wedges with the highest values. The ratio of the number of responses in wedge #1 to the number of expected responses(4) averages 1.8: 1, almost twice the expected number. The results from Table V-5, the analysis of responses by wedge, are used with the image-space maps to determine a direction of orientation(s). Plots from this table can be found in Appendix B for each of the 16 subjects. Figure V-4 plots the results from the table for all 16 subjects combined.

Axis of orientation, based on the direction of bias and the strength of this bias, are shown in Map V-7 for all 25 subjects. Note how they appear similarly aligned along the main artery running from the downtown business district southwest along a section of strip
development. This observation will be further considered in Chapter VI.

The information field is next grouped into four concentric circular regions. The distance between the center and the limit of the information field is divided equally by four; the radius of each circle once again as far from the center. The innermost circle contains an average of 16.8 responses or 70% of the responses. Figure V-5, similar to Figure V-2, shows the decay of information as a function of these circular regions. The graph in Figure V-5
Map V-6 Image-space study: response order (A)

compares relative distances rather than absolute distances or yards. This allows for the integrity of each information field to be maintained. The relative decay of information is compared among subjects. The inner circle contains the greatest number of responses. Again, a best fit curve is calculated for the data in Figure V-5.
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Number of responses by wedge greater or less than the expected 4.

Table V-5 Image-space study: wedge analysis

If, however, the concentric circles are drawn so that each contains six responses, or one-fourth the number, then each wedge bisecting each concentric circle can be expected to contain one response. The four concentric circles and six wedges divide the information field into 24 sections of equal response expectation. Comparing actual to expected responses for each of the 24 sections indicates areas which exceed and areas which fall short of expectation. The wedge-circle areas which contain no values are used to help define the empty-space
Figure V-4 Image-space study: wedges (all)

The responses from the image-space study, shown on the top map of Map V-5, are now grouped into an information field region and empty-space region. The former region is divided into a core area, field area, and island area(s). The delineated areas and regions are shown on the bottom map of Map V-5 for subject I, on Map V-9 for all 25 subjects, and in Appendix B for each of the 16 subjects who completed all three tests.

The analysis of the information field from the image-space study indicates that the field is clustered. The field shows a typical decay of information outward from the center,
but not equally in all directions. A primary, and sometimes secondary, directional bias appears which closely resembles the orientation of the geographic environment of Missoula, MT. A core area, field area and sometimes islands are easily defined. The directional bias results in an empty-space region which, together with the information field region comprises the image-space. Areas in the image-space which contain no significant information from the
running mean define the empty-space region. The why and the significance of the patterns are addressed in Chapter VI.

Second methodology: distance-perception study

This study is administered at the same time as the image-space study. Of the sample of 32 who took the test 25 returned usable questionnaires. The test asked respondents to rank distances between known places in the Missoula Valley. One question from the test,
Map V-8 Image-space study: empty wedges & field (H)

which appears in its entirety in Appendix C, is reproduced in Figure V-6. A multidimensional scaling technique is used with the distance matrix from the rankings of places. The process allows for a map of reconstructed geographic space to be made. If each relative distance is judged correctly the best fit solution for the matrix will match the Euclidean space of the geographic environment. When an error is made in assessing the
Map V-9 Image-space study: regions & areas (all)
Rank the 'crow fly' distances between the first place and each of the other eight places. Rank the distances in ascending order.

D) From the University of Montana (Oval) to:
   - Rattlesnake Wilderness (trail head)
   - East Missoula (town center)
   - Mount Sentinel
   - Malfunction Junction
   - Downtown Missoula (Main & Higgins)
   - Bonner Park (between Evans & Beverly and Ronald & Hilda)
   - Kelly Island (Clark Fork & Bitterroot Rivers)
   - South Hills (Hillview Way & 55th)

1 = closest  8 = farthest

**Figure V-6 Distance-perception study: instructions**

relative distances between places, the best fit solution will no longer match Euclidean space. This is nearly always the case. When mapped, these places are referred to as the recovered places. When this map is compared to actual geographic space the "error" between the recovered places and actual geographic places are calculated. Places are moved farther away or closer together depending upon how the subject has perceived the distances.

Map V-10 shows the average locations of recovered places for all subjects. Recovered locations are indicated with an open circle, actual locations with a solid one. The two sets of lines intersecting each open circle indicate the standard deviational ellipse for each recovered location. Most individual maps show some degree of stretching of space but little, if any, tearing. Imagine Map V-10 is plastic, and can be stretched. The plastic map is
stretched and twisted until the locations best fit the perceived space. Thus, if some place is experienced to be farther away than it is in geographic space, the map is stretched to accommodate my perceptions of space. Such maps can usually be made without having to tear, rip or rearrange the surface. A careful look at the complete set of individual maps in Appendix C will show that this is nearly always the case.
Map V-11 compares the recovered locations from the distance-perception study to the center of minimum aggregate travel from the image-space study. Areas where recovered locations have indicated a shift in space either towards or away from the center of minimum aggregate travel have been calculated and transformed into areas using a running mean technique similar to the one used in the image-space study. Map V-11 shows these areas for subject B; the remaining maps can be viewed in Appendix C. Areas where a significant shift occurs are indicated with an arrow in the direction of the perceived movement. The maps indicate that perception of space is non-Euclidean. More importantly, they show that there are significant differences between geographic and personal space, differences which have patterns. Areas showing a perceived movement of space away from the center occur most often in the field and core areas defined by the image-space study. Space in these areas is expanded at the expense of outlying areas.

The distance-perception test is not a friendly one. It asks for answers to a series of 64 difficult questions ranking distances between places. Because the questions ask for "crow-fly" distances it is likely that the resulting maps will not be a true indication of the distortion of geographic space that takes place within the image. Distances are both temporal and spatial. How long it takes us to get from one place to another is also an important indicator of distance. Likewise, distances are affected by our affects and plans. How long it takes us while going to work seems different than how long it takes us when going to play. The test is used because no better alternative is readily available, and because the results are the best available indicator of perceived geographic space.161

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161 See Butterfield, "Distortion."
Missoula, Montana 1:225,000

Map V-11 Distance-perception study: subject B

Third methodology: affect study

An important set of questions are asked in the third study. Where are the places that people avoid and where are the places that they approach? Sixteen places in the Missoula Valley are selected for testing. The study asks subjects a series of questions designed to elicit information about how they feel about these places. The methodology utilizes the semantic
differential technique described in Chapter 3. A copy of the questionnaire can be found in Appendix D. Figure V-7 shows the wording for three of the questions.

Twelve sets of word pairs are used for testing. These pairs reflect evaluative, belief, and activity factors. Table V-6 lists the word pairs and factors. The test asks the respondents to indicate their association between these word pairs and the selected places in the Missoula Valley. The places in the association test are a mixture of four control places and twelve places selected from the results of the primary or image-space test. The control points are four common landmarks in Missoula. The later places are selected from the core, field, and empty-space areas and regions.

Subjects are given a map of the Missoula Valley at a scale of 1:24000 with the sixteen places indicated on the map. An example of a map used in the study can be found in Appendix D. The places are deliberately drawn large so that the association is with an area and not a specific place. Once the scores have been standardized the places are evaluated. This standardization allows individual preferences to be compared. The belief factor utilizes only one question and is not used. Although the activity factor produces interesting results it too is not used after an initial evaluation of scores.

Map V-12 shows the results of the evaluative factors for approach and avoid for all subjects. A complete set of individual maps for both evaluative and activity factors can be found in Appendix D. Map V-13 shows the evaluative scores for subject H. A running mean calculation has been used to generate regions that are avoided, approached or neutral.
You are being asked to judge these places against a series of descriptive scales. In taking this test, please judge the places on the basis of what they mean to you.

1. fast : slow
   :   
2. approach : avoid
   :   
3. like : dislike
   :   

Figure V-7 Affect study: instructions

The size of the evaluated area is constrained to the image-space. Areas that indicate the subject showed a significant (greater than one standard deviation) tendency to approach are indicated by a dark shading while areas avoided are indicated by a light shading.

These maps show affects of like and dislike, areas the subjects approach and avoid. They are a crude attempt to map how individuals feel about places in their neighborhood. A greater number of evaluated places, more time, and a method utilizing a deeper trust with the researcher would certainly produce more accurate maps. These maps however, are a starting place for a discussion of the complex issues and factors of the behavioral environment.

From the three studies (image-space, distance-perception and affect) we now have an indication of some of the important spatial parameters and characteristics of the image; the elements, the distortion of geographic space, and the associated affects. Inly maps for each

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162 This is not the case for the maps in Appendix D. These maps use a slightly different legend and the scores have not been standardized. The discussion of the standardization of the scores can be found in Appendix D.
Activity Word Pairs
- Active...Passive
- Fast...Slow
- Loud...Quiet
- Tensed...Relaxed

Belief Word Pairs
- Sacred...Profane

Evaluative Word Pairs
- Approach...Avoid
- Like...Dislike
- Safe...Dangerous
- Good...Bad
- Clean...Dirty
- Pleasant...Unpleasant

Table V-6 Affect study: word pairs

of the sixteen subjects are made from these results.

The Inlymaps

The following sixteen maps, referred to as inlymaps because they map the image as a gestalt, are made from the maps in the image-space study (showing regions and areas, orientation, and limits), the distance-perception study (showing distortions of geographic space) and the affect study (showing evaluative factors). There is a limit to the amount of information that can be shown on any one map, and for this reason not all the information obtained is used.
Map V-12 Evaluative Affects: all subjects

The inllymaps show the information field region with core, field and island areas. The empty-space region, and the direction of orientation(s) are indicated as are the locations of the subjects home, work and center. Areas of distorted geographic space are indicated by arrows showing the direction of the perceived movement of geographic space in relation to the center. Areas avoided or approached (disliked or liked) are indicated by patterns on the
Information obtained from each of the three tests is combined on these 16 maps. Take a moment to browse through them. They show a great deal of information. They are called inly maps because the maps are a window into the souls of the individuals who
participated in the study. They reveal much about the behavior, affects and lives of those from whose images they were drawn.

Map V-14 shows information for a 41 year old male who has lived in Missoula for 18 years. The image-space is concentrated (.34 nearest neighbor coefficient) in the core area. A clear directional bias to the information field is shown to the southwest of the core area. North of the core is the empty-space region, occupying 63% of the image-space. A tension boundary, the thick dashed line between core area and empty-space region, is shown. The pattern of core, field and empty-space is typical of what will be called a Type I image-space.163

The information field in Map V-15 is not as concentrated (.59), and less area is occupied by the empty-space region (48%). There is still a clear directional bias and tension boundary however. Space in the core and field areas is perceived farther from the center than it is in reality.

This next two maps, Map V-16 and Map V-17, are oriented along north-south axes. The empty-space regions are not well defined, and the perception of space varies greatly from Euclidean geographic space. These maps show a Type II pattern to the image-space.

Map V-18 has a concentrated information field (.28) and is a Type I. The orientation is to the northeast where there is an island area. Space in the core and field areas is perceived as expanded while space in the empty-space region directly behind the core is compressed and perceived as nearer the center than in fact it is in geographic space. This

163Three types of inlymaps will, in Chapter VI, be defined, based on the type and strength of the orientation. Type I shows a strong orientation to the information field in one direction. The information field in Type II is oriented along an axis. Type III shows no clear orientation to the field.
inlymap indicates that the 51 year old male likes much of the core and field areas, and dislikes a good portion of the empty-space region.

Map V-19 indicates a Type III image-space. This type, the only one of its kind in this study, has no directional bias, and the core area, field area and empty-space region form somewhat concentric circles. The subject, a 33 year old woman, has lived in Missoula all of her life.

The information field in the next map, Map V-20, is concentrated (.29) but the core area is not contiguous. There are two areas where the responses cluster. There is a clear axis of orientation along the strip of development in the geographic environment. The empty-space to the northwest is sharply disliked, and space is perceived as expanded along the axis of orientation.

Although Map V-21 is classified as a Type I image-space the orientation to the southeast is due primarily to the presence of the two islands. The core area is well liked and both home and work are located here for the 40 year old woman.

This next map, Map V-22, shows core and field areas clearly liked and an empty-space both disliked and liked. The subject has lived in Missoula for 26 of her 41 years. The orientation is strong, and towards an island area in the south. A follow-up conversation with this subject revealed a clear awareness of island areas not only to the south, but to the north and northwest as well. The empty-space region became more well defined to the northwest, and the orientation shifted slightly to the west of south. It is clear that with more information the shape of the image-space will change. To what extent this will alter the
shape is not clear. It is felt that the 24 responses are a reasonable accurate sampling from the image.

Map V-23 has the largest of the 16 image-spaces. The bias is well defined to the west but the empty-space region is less well defined. Because of the elongated field area it is difficult to determine which space in the image-space should be defined to the empty-space region.

Map V-26, in marked contrast, has the smallest image-space. The information field is concentrated (.18), and the core area comprises a high percentage of the image-space. A small, disliked empty-space region and liked core and field areas support the hypothesis that the empty-space region will be disliked and the core and field areas liked.

The relationships between the image-space, the distortion of geographic space, and the affects like and dislike, are discussed in Chapter VI.
Informatio n Affect s Im age-Space Field Evaluative Fac to rs Eleme nt s

- MEDIAN CENTER
  - APPROACH
- Location(s) of HOME & WORK
  - NEUTRAL
- ORIENTATION
  - AVOID

Distance-Perception Factors

Away from Center Neutral Towards Center

Missoula, Montana 1:225,000 N

Map V-14 Inlymap: subject A
### Information Field

- **MEDIAN CENTER**
- **Location(s) of HOME & WORK**
- **ORIENTATION**

### Affects Evaluative Factors

- **APPROACH**
- **NEUTRAL**
- **AVOID**

### Image-Space Elements

- **EMPTY-SPACE REGION**
- **Core Area**
- **Field Area**
- **Information Field Region**

### Distance-Perception Factors

- **Away from Center**
- **Neutral**
- **Towards Center**

---

**Missoula, Montana 1:225,000**

- **Sex**: M
- **Age**: 11
- **Years in Missoula**: 22
- **# Responses outside study**: 2
- **Percent Image-Space empty**: 48%
- **Nearest Neighbor Coefficient**: .59
- **Type**: I

---

*Map V-15 Inlymap: subject B*
Information Field Affects Evaluative Factors Image-Space Elements

- MEDIAN CENTER — APPROACH
- Location(s) of HOME & WORK — NEUTRAL
- ORIENTATION — AVOID

Distance-Perception Factors

Away from Center Neutral Towards Center

Missoula, Montana 1:225,000

Sex \_ M \_
Age \_ 33 \_
Years in Missoula \_ 18 \_

# Responses outside study \_ \_ \_

Percent Image-Space empty \_ 34 \_

Nearest Neighbor Coefficient \_ \_ \_

Type \_ \_ \_

Map V-16 Inlymap: subject C
Information Field  Affects Evaluative Factors  Image-Space Elements

- MEDIAN CENTER  APPROACH
- Location(s) of HOME & WORK  NEUTRAL
- ORIENTATION  AVOID

Distance-Perception Factors

Away from Center  Neutral  Towards Center

Missoula, Montana 1:225,000

Sex  F
Age  31
Years in Missoula  18

# Responses outside study  0
Percent Image-Space empty  34%

Nearest Neighbor Coefficient  52

Type  II

Map V-17 Inlymap: subject D
Information Field | Affects Evaluative Factors | Image-Space Elements
--- | --- | ---
MEDIAN CENTER | APPROACH | Image-Space Boundary
Location(s) of HOME & WORK | NEUTRAL | EMPTY-SPACE REGION
ORIENTATION | AVOID | Tension Boundary

Distance-Perception Factors
Away from Center | Neutral | Towards Center

Missoula, Montana 1:225,000

Map V-19 Inlymap: subject F

Sex | F
Age | 33
Years in Missoula | 33
# Responses outside study | 0
Percent Image-Space empty | 33%
Nearest Neighbor Coefficient | .44
Type | III
Informatio Field Affects Evaluative Factors Image-Space Elements

- MEDIAN CENTER APPROACH
- Location(s) of HOME & WORK NEUTRAL
- ORIENTATION AVOID

Distance-Perception Factors

Away from Center Neutral Towards Center

Missoula, Montana 1:225,000

Map V-20 Inlymap: subject G
Informatio
Field
- MEDIAN CENTER
- Location(s) of HOME & WORK
- ORIENTATION

Affects Evaluative Factors
- APPROACH
- NEUTRAL
- AVOID

Image-Space Elements
- Image-Space Boundary
- EMPTY-SPACE REGION
- Tension Boundary
- Core Area
- Field Area
- Information Field Boundary
- Island

Distance-Perception Factors
- Away from Center
- Neutral
- Towards Center

Missoula, Montana 1:225,000

Map V-21 Inlymap: subject H

Sex F
Age 40
Years in Missoula 15
# Responses outside study 0
Percent Image-Space empty 33%
Nearest Neighbor Coefficient .54
Type I
Information Field Affects Evaluative Factors Image-Space Elements

- MEDIAN CENTER APPROACH
- Location(s) of HOME & WORK NEUTRAL
- ORIENTATION AVOID

Distance-Perception Factors

Away from Center Neutral Towards Center

Missoula, Montana 1:225,000

Sex F Age 41
Years in Missoula 26

# Responses outside study 0
Percent Image-Space empty 33%
Nearest Neighbor Coefficient .29

Type I

Map V-22 Inlymap: subject I
Information Field | Affects Evaluative Factors | Image-Space Elements
---|---|---
MEDIAN CENTER | APPROACH | Image-Space Boundary
Location(s) of HOME & WORK | NEUTRAL | EMPTY-SPACE REGION
ORIENTATION | AVOID | Tension Boundary

Distance-Perception Factors

Away from Center | Neutral | Towards Center

Missoula, Montana 1:225,000

Sex: F
Age: 31
Years in Missoula: 9
# Responses outside study:
Percent Image-Space empty: 50%
Nearest Neighbor Coefficient: 60
Type: I

Map V-23 Inlymap: subject J
Information Field  Affects Evaluative Factors  Image-Space Elements

- MEDIAN CENTER  APPROACH  Image-Space Boundary
- Location(s) of HOME & WORK  NEUTRAL  EMPTY-SPACE REGION
- ORIENTATION  AVOID  Tension Boundary

Distance-Perception Factors

Away from Center  Neutral  Towards Center

Missoula, Montana  1:225,000

Sex  F  Age  39

Years in Missoula  21

# Responses outside study  2

Percent Image-Space empty  2.5%

Nearest Neighbor Coefficient  26

Type  1

Map V-24 Inlymap: subject K
Information Field | Affects Evaluative Factors | Image-Space Elements
---|---|---
MEDIAN CENTER | APPROACH | Image-Space Boundary
Location(s) of HOME & WORK | NEUTRAL | EMPTY-SPACE REGION
ORTIENTATION | AVOID | Tension Boundary

Distance-Perception Factors

Away from Center | Neutral | Towards Center

Missoula, Montana 1:225,000

Sex | F
Age | 36
Years in Missoula | 4

# Responses outside study | 1
Percent Image-Space empty | 36%
Nearest Neighbor Coefficient | .45
Type | II

Map V-25 Inlymap: subject L
Information Field  Affects Evaluative Factors  Image-Space Elements

- MEDIAN CENTER  APPROACH  Image-Space Boundary
- Location(s) of HOME & WORK  NEUTRAL  EMPTY-SPACE REGION
- ORIENTATION  AVOID  Tension Boundary

Distance-Perception Factors

Away from Center  Neutral  Towards Center

Missoula, Montana  1:225,000  N

Sex  M Age  42
Years in Missoula  15

# Responses outside study  1

Percent Image-Space empty  33%

Nearest Neighbor Coefficient  18

Type  T

Map V-26 Inlymap: subject M
Information Field | Affects Evaluative Factors | Image-Space Elements
--- | --- | ---
MEDIAN CENTER | APPROACH | Image-Space Boundary
Location(s) of HOME & WORK | NEUTRAL | EMPTY-SPACE REGION
ORIENTATION | AVOID | Tension Boundary

Distance-Perception Factors
Away from Center | Neutral | Towards Center

Missoula, Montana 1:225,000

Sex | F
---|---
Age | 35
---|---
Years in Missoula | 26
---|---
# Responses outside study | 1
---|---
Percent Image-Space empty | 47.6
---|---
Nearest Neighbor Coefficient | 32
---|---
Type | T

Map V-27 Inlymap: subject N
<table>
<thead>
<tr>
<th>Information Field</th>
<th>Affects Evaluative Factors</th>
<th>Image-Space Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDIAN CENTER</td>
<td>APPROACH</td>
<td></td>
</tr>
<tr>
<td>Location(s) of HOME &amp; WORK</td>
<td>NEUTRAL</td>
<td></td>
</tr>
<tr>
<td>ORIENTATION</td>
<td>AVOID</td>
<td></td>
</tr>
</tbody>
</table>

**Distance-Perception Factors**

- Away from Center
- Neutral
- Towards Center

---

Missoula, Montana 1:225,000

- Sex: M
- Age: 35
- Years in Missoula: 30
- # Responses outside study: 1
- Percent Image-Space empty: 52%
- Nearest Neighbor Coefficient: 0.23
- Type: II

Map V-28 Inlymap: subject O
Information Field

- MEDIAN CENTER
- Location(s) of HOME & WORK
- ORIENTATION

Affects Evaluative Factors

- APPROACH
- NEUTRAL
- AVOID

Image-Space Elements

- Image-Space Boundary
- Empty-Space Region
- Tension Boundary
- Core Area
- Field Area
- Island

Distance-Perception Factors

- Away from Center
- Neutral
- Towards Center

Missoula, Montana 1:225,000

Map V-29 Inlymap: subject P
Chapter 6

CONCLUSIONS

As adults, then, our mental maps are a potpourri of fact and fiction, gleaned through a haphazard combination of direct, indirect and extra-perceptual experience. Some aspects of it are egocentric and based on connected paths, while other bits are geocentric and based on Euclidean distance-direction relations. We have forgotten some things and seen other things incorrectly. Our fears and prejudices and longings all have biased our way of looking at the world. It is understandable that a combination of these factors may badly warp our image of the environment.164

Phillip Muehrcke

This thesis has examined the spatial qualities of the behavioral environment or image as a gestalt. It has used three separate tests in conducting this examination. The tests were used to produce inlymaps for each subject. Three aspects to the image were examined in this process: the shape of the image, the organization of space within the image, and selected affects of the image. The study has tried to answer the fundamental question posed by geographers; where is it located?

Has the methodology succeeded in providing a picture of the image that will allow for the testing of the hypothesis? Have the hypotheses been proven or disproved? More specifically, is there a directional bias and empty-space region to the image? Is space in the image organized differently in different areas? Are certain affects related to certain regions and areas? This chapter addresses such questions.

164Muehrcke, Map Use, pp.5-6.
Each inlymap is personal and shows the preferences, perceptions of space, and affects for each individual. "All great, simple images reveal a psychic state," writes Bachelard.\textsuperscript{165} The psychic state revealed by the inlymaps built during the course of this study is one that shows a bias in certain directions. This bias appears related to 1) the geographic environment 2) the way in which individuals organize space, and 3) the tendency of individuals to either like and approach, or dislike and avoid places. The personal meaning of these patterns are best explored through Bachelard's topoanalysis: a personal undertaking conducted privately with one's analyst. Here, we can only comment on what processes are likely to be responsible for the patterns, and the consequences of this organization to the image. These conclusions and speculations are discussed later in this chapter. First the success of the methodology used to test the hypotheses is considered.

The methodology

A \textbf{controlled association} technique was used to elicit a "picture" of the image. This represents a unique usage of the method, usually used to facilitate in dream interpretation and analysis. The method produces an information field that can be subsequently analyzed and used in further studies. The field lends itself to a statistical analysis suited to the testing of the various hypotheses.

Two observations are made. First, the usage of a controlled association technique relies on a phrase of association. This phrase is used to recall the contents of the image associated with \textit{the place or places with which the subject lives with on a more or less daily and}

\textsuperscript{165}Bachelard, \textit{Poetics}, p.72.
weekly basis. The fact that the responses had to be written impeded the flow of this association. A more free flowing and complete picture could have been obtained if the individuals were allowed to talk freely about these places. The location of places in geographic space could then be plotted. Although this would entail considerably greater effort on the part of the researcher it would also produce a more complete and true picture of the complexities and multilayered nature of the image.

Second, the responses were limited to a place, its location, and the briefest of relationships to the individual. This did not allow for a complex response from the respondents. In the true spirit of a controlled association test this would not have been the case. Although subjects were given the chance to indicate their relationship to each response these relationships have not been discussed. These relationships have been considered only indirectly (through the affect study), and not through the usage of the information supplied, however brief, by the subjects themselves. An example, found in the third column of Table V-2 (see page 71) is: "pick up daughter and go in for ice cream." The terse comment is enough for us to imagine that the place is full of memories and feelings. The relationships that would inevitably surface through what has been called topoanalysis, would be of greater value than what was discovered through the study of the affects like-approach and dislike-avoid. Despite this, the controlled association test, with some fine tuning and changes appears to elicit a good picture of the image, worthy of further use.

The distance-perception study used a multidimensional scaling technique. It did not attempt to use this in a new manner. This test was used to produce a "picture" of how geographic space is distorted from Euclidean space by the subject. The information, when
compared to the image-space study, was used to produce a series of maps showing where space was perceived to be contracted or expanded in relation to the core area. Some of the shortcomings of this method were discussed in Chapter III (see page 50). The method, despite these shortcomings, appears to be of value in the study of the image.

The affect study used a semantic differential technique. While its use was applied to places rather than words or images, this seems to be an appropriate way to use the methodology. A less obtuse measure for determining affects, but also more complicated, would be through examining the responses in the image-space study, through topoanalysis, or indirect questioning. It is impossible to gain a precise picture of all the affects associated with the image through the semantic differential test. Reducing how we feel about a place to whether we like or dislike it is an oversimplification of a complex and multilayered issue. A better method would be, as has been indicated, to let the individual do free association. However, as a simple and small slice into the nature of the image, the method produces a believable picture.

The process of combining results from several methodologies to produce one picture is an intriguing one, although not new. The inlymaps provide fresh and new ways of exploring the image. They are limited by a black-and-white reproduction method and simple mapping technique. A more sophisticated mapping method and the use of color could allow more information to be shown with a greater readability. As an experiment, the maps help to raise questions about the role of the behavioral environment in our lives.
The patterns

The image-space study shows that the elements of the image are not equally dispersed. They are clustered in an area that includes the individual's home and work space. The area, defined as the core area, contains roughly two-thirds of all responses, and rarely exceeds one and one-fourth miles in radius. The respondent's home is an important feature, usually located within the core area. The elements show a typical decay with distance from the core area. Lundberg has shown that the contents of the image will decay with distance from a core.\textsuperscript{166} The important observation here is that the decay is not equal in all directions from the center. One direction, dominating over the others, contains nearly twice the expected number of responses. This direction reflects the general orientation of the geographic environment. The responses are dominated by built (opposed to natural features), directly experienced (opposed to indirectly experienced) centers (opposed to corridors, regions, landmarks and personal places).

An analysis of the image-space for the sixteen subjects reveals three distinct patterns of the information field (core, field and islands) and empty-space regions. The three types, listed on the individual Inlymaps and depicted in Figure VI-1, are:

\textbf{I) Directional bias with a strong empty-space.} In this type one direction dominates the bias of the information field. The elements are concentrated or clustered in a core area. Opposite the direction of orientation, and adjacent to the core area is an empty-space region. If there is an island it is usually oriented in the same direction as the field. See the inlymaps at the end of Chapter V for subjects A, B, E, H, I, J, K, M, N, and P.

\textbf{II) Bidirectional bias with multiple empty-space regions.} There is an axis of orientation in this type which bisects the core area. The information is biased along this axis; oriented in a primary and secondary direction. Islands

\textsuperscript{166}See Lundberg, "Phenomena", p.323.
Figure VI-1 The three main types of image-spaces

**TYPE I**
Directional bias with a strong empty-space

**TYPE II**
Bidirectional bias with multiple empty-spaces

**TYPE III**
No directional bias and a weak empty-space
are more prevalent, and the empty-space region is split, appearing perpendicular to the axis of orientation. See the inlymaps at the end of Chapter V for subjects C, D, G, L and O.

III) **No directional bias and a weak empty-space region.** The information field is clustered and the field area shows little directional bias in this type. If there is an empty-space region it is not well defined. See the inlymap at the end of Chapter V for subject F.

Fifteen of the 16 image-spaces were either Type I or II. Ten were Type I alone. This evidence supports the first hypothesis which states that the image will show a directional bias resulting in two significantly different regions; an information field and empty-space region. From an observation of the patterns it seems that although most subjects tended to conform to a Type I pattern several clearly did not. Because of the small sample size it is impossible to say that the image-space has a pattern similar to, or tending towards that shown as Type I. It may, in fact, have several distinct patterns, as suggested by the three types. Are these prototypical patterns to the image-space which are, in turn, associated with distinctly different patterns of affects, spatial distortions, and other aspects of the image? This study is only able to raise the question. Some people are oriented strongly in one direction, others along an axis of orientation, while still others show no clear orientation at all. It is interesting, and perhaps not coincidental, that the one Type III image-space belongs to the lone subject who has lived in Missoula her entire life. Perhaps time progressively eliminates the biases of the personal environment!

It would appear that the image is a function of three factors: distance, intensity and direction. Distance, in this case, refers to the distance from the core area, the individual’s home, work environment, or school. The farther any place is from these, the less likely it
is to be a part of the behavioral environment. Intensity refers to the size of a place. In the case of this study it refers to any number of factors which act to give a place significance. Such factors include the emotional content, history of association, frequency of use, desirability, etc. Places with a greater attraction and influence will dominate over less well known and attractive places. The concept of direction is new, introduced through the results of this work. One direction appears to dominate the distribution of elements in the information field of the image. Figure VI-2 shows the influence of these three factors on the contents of the image.

Distance, intensity and direction produces the patterns that result in the information region of core, field and island areas, and the empty-space region. The empty-space region is roughly the same size and distance from the core as the field area. See Figure V-5 on page 88. Lynch, Downs and Stea support the idea of the empty-space region, reporting that "cognitive maps of geographical areas tend to omit areas" and that subjects tend to "omit a particular section of the city in their representations."167

The first hypothesis, that the image will show a pattern of directional bias with an empty-space, is supported by the inlymaps at the end of Chapter V, and by the observations and analysis conducted on the information field.

We live, work, shop and recreate in the neighborhood-city of our choice, and our behavior is influenced by the geographic demands of these and other places. There can be no doubt that the geographic and contextual environments play an important role in defining the spatial qualities of our image. In looking at the pattern of orientation supplied by the

167Leff, Experience, p.193.
Figure VI-2 Distance, Intensity and Direction
inlymaps, it is obvious that the geographic parameters of Missoula are an important influence. It is interesting to note that the northside neighborhood is associated with a disliked or avoided empty-space region. This area of town is characteristic of an avoided lower income residential area (see Map V-7 and Map V-9, on pages 87 and 90). We might conclude that the geographic and contextual environments play a predominate even deterministic role in the basic spatial pattern found in the image. However, these two environments cannot explain the sudden change from core to empty-space found on many of the inlymaps, and the association with the empty-space as an area one tends to avoid or dislike. Nor can they explain why space in the core and field areas trend to be expanded while space in the empty-space region is contracted. Perhaps our orientation is an extension of our body and its senses, imposed on the land. In this study we looked at an image of a predominantly built-up environment; a city. But Map III-2, on page 47, showed the same pattern of directional bias for a predominantly natural or nonhuman environment. Perhaps the geographic environment simply provides a place for the projection of our psyche.

Our organization of space is non-Euclidean or topological. The results from the distance-perception study do not in any way prove this, but they do provide us with an indication as to how we distort Euclidean space. Space in the core and field areas is generally expanded while space in the empty-space is contracted. This means that we have "made room" for the greater number of elements to be found within the core by expanding our sense of this space. We contract the area in the empty-space because it contains little or no
importance in our image. These conclusions are supported in part by Leff. He observed a similar expansion and contraction of space in relationship to liked and disliked areas.\textsuperscript{168}

While it may seem obvious, the effect the empty-space and directional bias on our behavior is not a rational one. We may perceive a grocery store to be farther away than it is, and thus do not patronize it. This was certainly the case in a study of parking, parking lots and parking behavior undertaken by the author at an earlier date.\textsuperscript{169} Parking lots of equal distance from central locations were not equally utilized. Lots perceived to be farther away than they actually were, were utilized less than those perceived to be closer.

Table VI-1 shows the results from a comparison of the core, field and empty-space to the areas where space was contracted or expanded for the subjects of the current study. The tendency to expand the familiar, more highly trafficked space near the core is clear. The tendency for the empty-space to be contracted is a result of our unfamiliarity and avoidance with this region. Our organization of space is a function of the image-space. While we cannot say for certain that the greater the frequency of response the greater the degree of expansion, and visa versa, there is a tendency towards this conclusion.

The affect study looks at evaluative affects in relation to the image-space. Some places evoke stronger affects than others, some places are more complex and some places can easily be generalized. The areas of like-approach and dislike-avoid are compared to the image-space. The hypothesis, that the empty-space will be disliked and the core liked, is upheld. Table VI-2 shows a comparison between the image-space and affect studies; and it


DISTORTION OF GEOGRAPHIC SPACE

Expanded ← Neutral → Contracted
(no distortion)

Core & Field

<table>
<thead>
<tr>
<th></th>
<th>16</th>
<th>13</th>
<th>10</th>
<th>8</th>
<th>1</th>
</tr>
</thead>
</table>
Empty-Space

|          | 4 | 8 | 19 | 10 | 7 |

Expected | 10 | 10½ | 14½ | 9 | 4 |

Shaded boxes indicate values that are greater than or equal to the expected

**Image-space and Distance-perception studies:**
Number of occurrences

<table>
<thead>
<tr>
<th>Table VI-1 Image-space and Distance-perception</th>
</tr>
</thead>
<tbody>
<tr>
<td>overwhelmingly supports the hypothesis that the core area will be associated with the affects like-approach and the empty-space with the affects dislike-avoid.</td>
</tr>
</tbody>
</table>

The above conclusions may seem obvious. We tend to like the place where we live and work, otherwise we move and take a new job. We do not know much about, care about, or use the empty-space and therefore dislike it. Places we dislike we avoid! The underlying consequences of this relationship, however, between our affects our orientations and our perceptions of distances, are far reaching, and should not be taken lightly.
**EVALUATIVE AFFECTS**

<table>
<thead>
<tr>
<th></th>
<th>Dislike-Avoid</th>
<th>Neutral</th>
<th>Like-Approach</th>
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</thead>
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<td>9</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>Field</td>
<td>37</td>
<td>66</td>
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</tr>
<tr>
<td></td>
<td>66</td>
<td>55</td>
<td>57</td>
</tr>
<tr>
<td>Empty-Space</td>
<td>116</td>
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<td>63</td>
</tr>
<tr>
<td></td>
<td>66</td>
<td>55</td>
<td>57</td>
</tr>
</tbody>
</table>

Shaded boxes indicate a value greater than or equal to the expected value (italics)

**Image-space and Affect studies:**

Number of occurrences

**Table VI-2 Image-space and Affects**

Our relationship to the environment is a function of our image, a result of three environments; the geographic, the contextual and the personal. From the geographic and contextual environments we select places, regions, landmarks and pathways to like and dislike, organizing these in a way that appears to be a projection of our body, feelings, plans, memories and desires relative to the physical environment. We have referred to this projection as the **space** and the **image** of the behavioral environment. In the next section the behavioral environment is considered in light of the results of this research.
"Space" is an abstract term for a complex set of ideas. People of different cultures differ in how they divide up their world, assign values to its parts, and measure them. Ways of dividing up space vary enormously in intricacy and sophistication, as do techniques of judging size and distance. Nonetheless certain cross-cultural similarities exist, and they rest ultimately on the fact that man is the measure of all things. This is to say, if we look for fundamental principles of spatial organization we find them in two kinds of facts: the posture and structure of the human body, and the relations (whether close or distant) between human beings. Man, out of his intimate experience with his body and with other people, organizes space so that it conforms with and caters to his biological needs and social relations.170

**The behavioral environment**

The behavioral environment has been defined as both space and image: containing elements from the geographical, the contextual and the personal environments. It is a "psycho-physical field in which phenomenal facts are arranged into patterns or structures (gestalten) and acquire values in cultural contexts."171 As image it is a function of the three environments, containing elements from each. As space it contains selected elements from the geographical and contextual environments arranged and distorted according to the demands of the personal environment. Also as space it is a function of distance, intensity and direction from the center or core area.

This thesis has developed a workable methodology for the testing and exploration of the image and space of the behavioral environment. It has used this methodology to test the hypothesis that the image-space will show a bias in a direction or directions. The study concludes that one direction will in fact bias the orientation of the field in most cases. This pattern is referred to as the Type I image-space. Map V-22 on page 111 is a good example of a Type I pattern. Two exceptions to this type are observed. Type II space shows a bidirectional orientation, where an axis of orientation exists with both primary and secondary

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170 Tuan, *Space and Place*, p.34.

orientations. Map V-20 on page 109 is an example of a Type II pattern. Type III space shows no directional bias. See Map V-19 on page 108. All three cases result in one or more regions defined as the empty-space. In some cases the region is more well defined than in others. This region is, for all practical purposes, unknown to us in a similar sense that North America was once unknown to Europeans. Although we may know of the physical existence of a few of the elements in the empty-space region, we care little about them. It is not a part of our conscious and active lives. John K. Wright, in his famous address, speaks most eloquently about the unknown:

China lay deep in the heart of terra incognita to the Romans, but the Roman Empire was equally lost in "unknown land" to the Chinese....

Hence, depending on our point of view, there are personal, community, and national terrae incognitae; there are terrae incognitae to different cultural traditions and civilisations; and there are also the terrae incognitae to contemporary geographical science....

If, therefore, terra incognita be conceived as an area within which no observed facts are on record in scientific literature or on maps, the interior of my place in Maine, no less than the interior of Antarctic, is a terra incognita, even though a tiny one.172

The unknown or empty-space region, for most of us, borders the most intensely known and trafficked area of our image-space; the core area. Because of this, a tension exists along the sharp boundary between the core and empty-space. The tension is necessary to maintain the differences between the two regions. When information and content change gradually over a distance, no tension exists. But when two bordering areas differ greatly in both density and content, as is the case with the core area and empty-space region, a tension exists at the boundary. The tension may take the form of fear, distrust, misconception, hatred, or fantasy. Whatever the form, it prevents us from experiencing the true nature of

the place. Our misconception or projection comes between us and the place itself. In turn, it is this projection, not the place, that we experience and see. Most of the patterns to the Type I and Type II image-spaces show such sharp boundaries, supporting the hypothesis that an empty-space region exists.

The nature of this tension boundary is not a part of the explorations of this study. That it in fact exists, as much as we can say that the image itself exists, is of interest and note. Such a boundary must necessarily play an influential role in our lives. The empty-space needs not necessarily take on a negative or alienating role. Certainly there are other forms than the ones discussed here. Sometimes we do care about the contents of this region and go to great lengths to learn about and care for the terra incognita. The geographic unknown has had great explorers (e.g., John W. Powell who explored the west). There have also been great explorers of the contextual (e.g., the geographer Carl O. Sauer) and personal environments (e.g., Sigmund Freud or Carl G. Jung). Each has had to confront the tension between the known and the unknown, and has had to be willing to set aside personal misconceptions and projections to see clearly into the empty-space beyond. This thesis concerns itself with the day-to-day humdrum of our lives. The unknown, discussed here, is not deliberately sought out and explored with fresh and courageous vigor. Rather it has become a fixture, located in the time and space of our behavioral environment that reflects aspects of our psyche that are unconscious.

This study has been concerned with where elements of the image are located in the space of the behavioral environment. In addition to observing three basic types to the spatial organization to the image-space, other aspects to the hypotheses are also supported. The core
area is found to be associated with the affects like and approach while the empty-space region
with the affects dislike and avoid. Geographic space in the core area is found to be most
likely expanded, while in the empty-space it is contracted. Why is the image-space organized
in this manner and why is it associated with certain affects and organizations of space?

Yi-Fu Tuan observed that the "habit of differentiating space into center and
periphery,... seems to be worldwide."173 Tuan draws a diagram of space "projected from
the body ...biased toward the front and right." Figure VI-3 shows Tuan’s diagram of
"Upright Human Body, Space and Time."174 Although he does not provide a clear rational
for this figure, it is remarkably similar to a Type I image-space. Space is biased toward one
direction. "To orient himself in the world man seems to require a sense of the development
of persons, things, and places around a center, and this center thus acquires paramount
importance over all around it."175 This pattern reflects our own body, the sensory
organization of which is also biased in one direction. Take a look at Figure VI-4, Map I-3,
Map III-1 and Map III-2 (pages 137, 19, 44 and 47). All of these maps and figures present
a similar footprint.

One way of explaining why the image-space is organized in the way it is, is that we
have made it in the image of our self with our self at the center in the form of our home, and
core area, which is then projected onto the environment in the field, island and empty-space.
The orientation of our lives follows the orientation of the contextual and geographic
environments which we like and with which we identify. T. F. Saarinen writes that "it is

173Yi-Fu Tuan, 'Ambiguity in Attitudes', p.416.
174Tuan, Space and Place, p.35.
Upright human body, space and time. Space projected from the body is biased toward the front and right. The future is ahead and "up." The past is behind and "below."

Figure VI-3 Upright Human Body, Space and Time

territorial in a more profound sense; that individuals feel different spatial regions belong to, or do not belong to, them and, correspondingly, feel that they belong to (or in) a specific spatial region or do not belong."¹⁷⁶ The locations of our home and work form the centers

to our core environment. All of these places are ones with which we likely identify. Out from this core area we orientate our lives in a direction (Type I), or along an axis (Type II). The places we shop and the places we recreate are selected because they are also expressions of who we are. These places form a field area of mixed but primarily liked space. In these places we meet friends and move along familiar pathways. Read what De Rivera has to say:
To paraphrase Lewin: Our psychological environment consists of objects and events. These effect our behavior not only by facilitating or obstructing our actions, but by confronting us "with a will of their own" and challenging us to specific actions. The intensity of these challenges and demands varies from an irresistible to a very weak force; these valences may be positive and press us to approach, or negative and press us to retreat. But the crucial factor of valences is that they press for certain definite actions, the range of which may be broad or narrow.177

The front-back asymmetry is one "with which the individual is most familiar and to which he has greatest personal attachment".178 To our back, behind the core area, and in the shadow of our directional bias is the empty-space. Front and back, according to Tuan have different values, "so obvious that we hardly pause to consider [their] implications... on human spatial behavior and organization."179 Tuan continues to explore and pose questions. "Somatic and psychological asymmetry is projected into space, which acquires the meaning and value of front and back. The asymmetrical designation of space occurs at different scales."180 Tuan compares the human body itself to this designation of front and back.

Symmetrical space cannot be persistently maintained about the individual for another reason. Space is perceived through the senses: the eyes can discern objects and the mind postulates space as their matrix and frame. The instrument for perceiving the world is the body, but the body is not symmetrical.181

The empty-space, also a projection of our body, is behind or to the back side of the orientation. It is often an area in the geographical environment that we dislike and avoid.

178Gold, Behavioral Geography, p.79.
180Ibid., p.186.
181Ibid., p.185.
There are parts of ourself we tend to dislike, deny and avoid. Psychoanalysts state with assurery that such avoided parts of ourself will necessarily be projected onto the people and places of the world outside of us. "The frequency of such projections is as certain as the fact that they are never seen through." Tuan cites Ervin Goffman when he comments that "public buildings and private houses have clearly demarcated front and back regions." Tuan continues. "Can a city be said to have a front entrance and therefore by implication, a rear door or side gates?... Finally, it is tempting to raise the question as to whether an entire nation may be said to have a front and a rear?" We project these parts of ourselves both far away and near; hostile Martians, evil Russians, and the avoided northside.

Thus nature, as what is "natural", became the object of projects of knowledge, and the un-natural, like the monsters of Herodotus, remained on the periphery. Strange and unknown places were associated with those faculties that were strange and unknown to the mind itself, imagination and emotion.... No clearer view of this [fear of the unknown] has been made than Joseph Conrad's classic Heart of Darkness, where the relationship between madness and sanity is made geographically specific.

There is the simplistic tendency to say that the empty-space will be the place for these projections, but this would be to simplify the complex dynamics of the psyche. Although the controlled association test tried to elicit a picture for one common scale, the neighborhood-city, it is likely that the elements were drawn simultaneously from many different scales; home, neighborhood, city, valley, etc., each with a specific set of different associated affects. Elements from one scale may in fact take on a different meaning at

182 Jung, Structure and Dynamics, pp.265-266.
184 Ibid., p.187.
another scale, thus complicating any conclusions we might draw. Goffman studied the psychological connotations of front-back.

In general, of course, the back region [of the performance] will be the place where the performer can reliably expect that no member of the audience will intrude...it is natural to expect that the passage from the front region to the back region will be kept closed to members of the audience or that the entire back region will be kept hidden from them.186

However, while there is a tendency for a region to become identified as the front region or back region of a performance with which it is regularly associated, still there are many regions which function at one time and in one sense as a front region and at another time and in another sense as a back region.187

I have been using the term “performance” to refer to all the activity of an individual which occurs during a period marked by his continuous presence before a particular set of observers and which has some influence on the observers. It will be convenient to label as “front” that part of the individual’s performance which regularly functions in a general and fixed fashion to define the situation for those who observe the performance. Front, then, is the expressive equipment of a standard kind intentionally or unwittingly employed by the individual during his performance.188

Of fundamental importance is our understanding that we, as humans, impose a schema, or image, on space by our mere presence.189 The effect of this schema is far reaching. There is little reason to believe that I will maintain the same degree of objectivity in responding to or evaluating an area of the environment that is a part of my personal core area as with one which is a part of my personal empty-space.

For most of us, seeing landscapes carefully and clearly is difficult because reflection requires time. Even if we are fortunate enough to have the time, real seeing still demands a willingness to expend imaginative energy and to be open to the world around us.190


187Ibid., p.126.

188Ibid., p.22.

189Tuan Space and Place, p.36.

Because the factors that determine and define the empty-space are probably unconscious and a part of the psyche which the individual denies, he will not be aware of his bias. At the same time he is identified with those aspects of his psyche located in the core area. This makes his behavior irrational at times. The figure showing the geographic, the

Figure VI-5 Type I Image-space and environments
contextual and the personal environments, the behavioral environment and the image-space is once again redrawn; this time to include an Inlymap of a Type I image-space. Figure VI-5 shows the space and the image of the behavioral environment, comprised from selected elements in the three environments, bias in one direction, and including an empty-space region. The nature of the behavioral environment is worth further consideration.
Appendix A

GLOSSARY

These definitions, some more formal than others, appear in the text.

**Affect**: Affect is used to refer to a feeling or emotion. "Affect is the psychological term for the inner experience of an emotion or feeling. The term emotion, by contrast, is used to refer to the combination of experiential, behavioral, and psychological processes involved in states such as anger, fear, and joy."191 "By the term affect I mean a state of feeling characterized by marked physical innervation on the one hand and a peculiar disturbance of the ideational process on the other."192

**Behavioral Environment**: As we process the information and content of the three environments (geographic, contextual, and personal) a behavioral environment is formed. This behavioral environment is a "psycho-physical field in which phenomenal facts are arranged into patterns or structures (gestalten) and acquire values in cultural contexts. It is the environment in which rational human behavior begins and decisions are taken which may or may not be translated into overt action in the Phenomenal Environment."193 Because the behavioral environment is defined by both our psyche and the geographic and contextual environments, it takes characteristics and qualities from each. It is at once space and an image. In this study inlymaps are made of the image-space. This image-space, it is argued, is the same as the behavioral environment; a place where the image takes meaning for us in space.

**Cognitive Schema**: "Schemata are related to but by no means coincident with the physical reality that lies outside us."194 Schemata are a coding system within which past experience and present environmental or sensory experiences are organized in a context which is both locational and attributive.195 "... schemata (or schemas) are cognitive, mental plans that are abstract and serve as guides for action, as structures for interpreting information, as organized

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frameworks for solving problems, etc. The cognitive schema is that part of the image or behavioral environment containing spatial relationships, locational data, and attributive knowledge. The schema may be recalled "almost subconsciously", as in the case of native travel, where habituation frees the individual's mind to think about other things.

**Contextual Environment:** The social class, culture, and stage in the life-cycle of the individual. The contextual environment, along with the geographic and personal environments, shapes and defines the contents of the behavioral environment or image-space. This space and image determines an individual's behavior. The contextual environment is cultural and social, and changes as we change, age and move.

**Controlled Association:** "Any unconstrained association made between ideas, words, thoughts, etc. It has been used... as a projective device to explore the unconscious." The logical principle called *amplification* is "simply that of seeking the parallels... It is a well-known logical procedure which we apply here and which formulates exactly the technique of finding the context." The term is also referred to as amplification and is related to free-association. "The collection of additional material proceeds according to the same principle of recollection, which has also been called the method of free-association. The result, as can be readily understood, is an accumulation of very diverse and largely heterogeneous material, having apparently nothing in common but the fact of its evident associative connection with the dream-content, otherwise it could never have been reproduced by means of this content." Whereas psychoanalysis proceeds by means of free-association, Analytical Psychology works with a kind of controlled or "circular" association for the purpose of amplifying each element in a dream. Instead of a chain of associations proceeding in a straight line... this "controlled" association executes as it were a circling movement round the various components of a dream. Thus one never loses sight of the dream. This kind of association is, according to Jung, like "a search-light carefully and consciously directed on those associations which are grouped round the keyword of the dream." In this study controlled association is used with the key phrase *the place or places with which you live on a more or less daily and weekly basis.* This method is used to elicit a picture of the image-space.

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202 The phrase is taken from the instructions for the image-space study.
Core Area: The core area and core-periphery are part of the structure of the image-space. The information field acquired through the amplification study is distributed unequally within the study area. In this paper the core area defines the region containing the greatest density of places in the information field. This area is defined with "soft" borders, except where bordered by the empty-space region. The core area emerges more or less self defined from observation of the distribution of places in the information field. It contains upwards to 60% of all places in the region. The cognitive center, a hypothetical place or places (based on the location of the home, work and/or school) is located within this core. The orientation of the individual is outward from this center or centers in the core area. In this study the median center (as determined from the information field) is used to define the cognitive center. The core region dominates awareness of the periphery and empty space.\textsuperscript{203} "The idea of "center" and "periphery" in spatial organization is perhaps universal. People everywhere tend to structure space--geographical and cosmological--with themselves at the center and with concentric zones (more or less well defined) of decreasing value beyond."\textsuperscript{204}

Empty-Space: In this study the empty-space is a region of the image-space defined on the basis of the information field. The empty-space comprises all areas that are significantly empty or not a part of the information field. The region is often located between one-quarter and one-half the distance between the median center and the limit of the information field, and opposite to the orientation of the field. The empty-space region is an area of significantly missing information. The space is seen as that part of the \textit{terra incognita} that is not only unknown but is also unknown to be unknown. Because "... everything in us of which we are unconscious, is automatically projected" the empty-space region is related to a part of the psyche.\textsuperscript{205} No sharp boundary defines the empty-space except where is borders on the information field region.

Field Area: The information field generated by the controlled association study varies in density and distribution. It contains the core area, the field area and outlying islands. The field area is an area of the information field of less density than the core, is continuous with the core, and is usually dispersed outward from the center in the direction of the orientation.

Geographic Environment: The phenomenal environment or the external world of geographic facts and objects per se.\textsuperscript{206} The geographic environment can be divided into human, build and natural worlds that are both known and unknown to us.\textsuperscript{207}
Island: In this paper islands are defined as outlying parts of the information field not contiguous with the field area or core. They are surrounded by areas lying outside (but not a part of the empty-space) the information field.

Image: "The inner image is a complex structure made up of the most varied material from the most varied sources. It is no conglomerate, however, but a homogenous product with a meaning of its own. The image is a condensed expression of the psychic situation as a whole, and not merely, nor even predominately, of conscious contents pure and simple. It undoubtedly does express unconscious contents, but not the whole of them, only those that are momentarily constellated. This constellation is the result of the spontaneous activity of the unconscious on the one hand and of the momentary conscious situation on the other, which always stimulates the activity of relevant subliminal material and at the same time inhibits the irrelevant. Accordingly the image-space is the expression of the unconscious as well as the conscious situation of the moment. The interpretation of its meaning, therefore, can start neither from the conscious alone nor from the unconscious alone, but only from their reciprocal relationship."208 "What I have been talking about is knowledge. Knowledge, perhaps, is not a good word for this. Perhaps one would rather say my Image of the world. Knowledge has an implication of validity, of truth. What I am talking about is what I believe to be true; my subjective knowledge. It is this Image that largely governs my behavior...."209 The image then is a condensed expression of the psychic or personal environment, both consciousness and unconscious, and the geographic and contextual environments, both known and unknown. It is also referred to as the behavioral environment but the terms are not used in quite the same way. The image is more closely associated with our psyche whereas the behavioral environment, although perhaps an extension of our psyche, is also an environment with spatial qualities, and more of a projection of the psyche.

Image-Space: The image-space is defined from the inlymap as the space occupied by the information field (core area, field and islands) and empty-space. This space is associated with, but not the same as, the behavioral environment. The environment defined by the gestalt the three environments, personal, contextual and geographic, appears similar to the image-space. The image-space, also a gestalt, of both image and space, is defined from the active constellation of the psyche in response to a specific place or places. The methodology in this study produces inlymaps which define the image-space as a function in terms of distance, intensity, and direction from the cognitive center of the person.

InlyMap: From inly [inner or within] and map [a spatial representation]. An inlymap is a map of the image or cognitive schema as a whole. Any method or combination of methods that produces a map of the gestalt of the image is an inlymap. As an example Kevin Lynch's

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208Jung, Psychological Types, pp.442-443.
209Boulding, Image, pp. 5-6.
methods produce inlymaps. Mental maps produced by individuals drawing maps from memory of their neighborhoods are not considered inlymaps.

**Information Field:** "The mental information that an individual has about the spatial distribution of a specific set of environmental elements. Most information fields display distance-decay characteristics, i.e. the individual has more information about nearer places than ones further away. Such private or spatial information fields will be the areas an individual knows best and within which his/her activities will be located." In this paper the information field is defined from the recalled places in the amplification study. This information field is viewed as a reflection or picture of the image as a whole in this moment of time and space. The field shows a distance decay outward from a center, and an orientation in one, sometimes two, directions from this center. The information field is comprised of three areas; the core area, the field area, and outlying islands. The location and amount of information that is contained in the field is a function of (1) the distance from the core or center, (2) the information content or intensity of the image(s), and (3) the direction of orientation.

**Information Field Limit:** The information field region is an open system. However, at any one moment in time it is bounded by "phrase of association". In the case of this study it is more or less the place with which you live with on a daily and weekly basis. This means, more or less, Missoula Montana and the mountains and rivers that surround the city for the subjects of this study. See the definition of the study area.

**Mental Map:** Mental or cognitive maps are part of the image or cognitive schema that organizes spatial relationships into maps or map like images. "Such representations of the environment are called by different names, such as "cognitive maps" or "spatial representations," but my favorite is the simple phrase "mental maps." This term should be interpreted very metaphorically, however, since the way people normally represent environments to themselves, or even the internal guides they use for navigation, may not be much like a cartographer's version of a map." "If we accept that schemata represent the subjective knowledge structure of an individual—a sum of his knowledge, values and meanings organized according to certain rules and affecting behavior, then mental maps are those spatial images which people have of the physical environment and which primarily affect spatial behavior." "Cognitive mapping is a process composed of a series of psychological transformations through which an individual acquires, codes, stores, recalls, and decodes information about the relative locations and attributes of phenomena in his everyday spatial

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210 See Lynch, *Image of the City.*
211 Goodall, *Dictionary,* p.235.
environment."214 "A cognitive map is a term that refers to knowledge of our position in a spatial layout, and knowledge of the position of objects and places relative to our location."215

**Multidimensional Scaling:** Multidimensional scaling "is a technique that is designed to construct a 'map' showing the relationship between a number of objects, given only a table of distances between them."216 It is "an iterative process of producing coordinate positions for a set of point features to closely approximate a matrix of input distances between those features. The input matrix may contain metric or non-metric (ranked) distances. The solution may place coordinates in one, two or more dimensions. For cognitive mapping problems, two-dimensional coordinates are most often constrained... one assumes that all point features are equally familiar to each individual."217 A selection of places in the Missoula valley were used in the distance-perception study to produce a map depicting the topological reality of the geographic environment as experienced by the individual.

**Orientation:** "I use this term to denote the general principle governing an attitude (q.v.). Every attitude is oriented by a certain viewpoint, no matter whether this viewpoint is conscious or not."218 In this study orientation is defined as the direction or directions from the median center that show the greatest dispersion of recalled places. Although an orientation is not always defined, and not always defined in only one direction, often a clear direction is apparent. Orientation is both physical (as in the distribution of points in the information field) and psychological (as in one's affects for places in the field).

**Personal Environment:** The personal environment is our inner world of thoughts, feelings, dreams, memories, desires, and personal histories "... the totality of all the psychic processes, conscious as well as unconscious."219

**Region:** "A configuration or grouping of parts or elements with a coherent structure."220 In this study two regions are identified; the Information Field and the Empty-Space. "A region is not necessarily a connected one,"221 as is the case in this study where the

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214Downs & Stea, Image and Environment, p.9. See also Goodall, Dictionary, p.77.


216Manly, Multivariate Statistical Methods, p.126.

217Butterfield, "Comparing Distortion on Sketch Maps," p.239.

218Jung, Psychological Types, p.456.

219Ibid., p.463.


221Lewin, Topological Psychology, pp.216-217.
information field region may contain islands discontinuous with the core and field areas of the region.

**Semantic Differential:** "A technique due to Charles Osgood and his co-workers for evaluating the connotative meanings of individual words."222 "The "semantic differential" is essentially a rating technique whereby something is evaluated on a number of short rating scales, each labeled or "anchored" by a bipolar adjective pair (for example, "good:___:___:___:___:___:bad"). This technique has been used in a wide range of psychological research, and regardless of what is being rated (people, words, environments, and so on), three dimensions tend to underlie the ratings: an evaluative factor (good-bad), a potency factor (strong-weak), and an activity factor (active-passive).223 In this paper the technique is used to study affects in the study area; specifically evaluative factors (good or towards... bad or away). This is the primary methodology used in this paper.

**Study Area:** The area within six miles from the population mean center of Missoula, MT (6th and Russell streets) but including any place outside this area visible or audible from within the area (i.e. Lolo, Stewart or Squaw Peaks). The area is selected to include most of the points in the information fields from the image-space study.

**Tension-Boundary:** The boundary [of a psychological region] is determined by "those points of a region for which there is no surrounding that lies entirely within the region... Psychologically one can distinguish sharp and unsharp [soft] boundaries. In the case of a sharp boundary it can be determined for every point of the life space whether or not it belongs to the region in question."224 Tension is a "state of a region relative to surrounding regions. It involves forces at the boundary of the region which tend to produce changes such that differences of tension are diminished."225 "Boundaries act as a barrier or filter to all types of spatial interaction..."226 The boundary between the core area and the empty space is of special concern in this study. The two bordering regions are markedly different, one containing no recalled places, the other containing the greatest density of recalled places. Some psychological barrier in the image or behavioral environment is likely to exist between these two regions.

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225 Ibid., p.218.
226 Goodall, Dictionary, p.45.
Appendix B

IMAGE-SPACE STUDY

Image-Space Study: survey

Figure B-1, Figure B-2, Figure B-3 and Figure B-4 show the instructions given to the subjects who participated in this study along with a completed survey for the image-space study.

Image-Space Study: distribution of points

Figure B-5 through Figure B-12 on the following pages show how directional bias was calculated for each of the sixteen subjects. The image-space is sliced into six wedges, each of 60 degrees and centered on the point of minimum aggregate travel distance. The number of points in each wedge is counted and indicated by the size of the wedge. A double line indicates that four points were found in the wedge. Direction bias being nil, four points will each fall to a wedge. Smaller wedges indicate fewer than four points, while larger wedges indicate greater than four points were found. To determine orientation the results from this analysis were compared to the distribution of the points from the center. If a wedge contained greater than its share of points this did not mean necessarily an orientation; as would be the case if the points were clustered close to the center.
Image-Space study: maps

Map B-31 through Map B-16 show the results for the image-space study. Each subject is represented by two maps. The top map shows the location of responses from the questionnaire. The subjects' home and work locations are also located. Desire lines have been drawn from the center of minimum aggregate travel distance or median center. Points in the information field but outside the base map of the map are indicated by an arrow and labeled (i.e. Stewart Peak).

The bottom map shows the core area, field area, islands (if any) and the empty space region.
The Place With Which We Live

The following survey is being conducted by Steven R. Holloway of the University of Montana Geography Department. The survey, part of a Masters Thesis in geography, is concerned with how we interact with and understand the place in which we live.

The following information is used for coding purposes. It will not be associated with your answers.

NAME

DATE

LOCATION

(Location while completing this survey.)

Figure B-1 Image-Space survey: introduction
The Place With Which We Live

This survey gathers information on the place and places with which you live with on a more or less weekly basis. Because most of us live in the Missoula valley, Missoula itself will likely contain most or all of these places. The survey asks you to list the places that come to mind when thinking about this area. Whatever comes to your mind is an appropriate answer.

Please list on the following pages the first 30 places that come to your mind. There are no right or wrong answers. A place can be equally a house, field, building, road, facility, business, or river. Briefly describe the place in such a way that it can be located on a map. Include a word or phrase to indicate your relationship to the place (i.e. Where I watch baseball).

Let your mind wander. Do not limit yourself to places within the city of Missoula but do limit yourself to those places with which you interact, through any of your senses, on a more or less weekly basis.

**EXAMPLE:**

14. *Autzen Stadium, 418 Centennial Drive, Where I watch baseball.*

Figure B-2 Image-Space survey: page 1
<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>My House - 1234 Elm Ave.</td>
</tr>
<tr>
<td>2.</td>
<td>Timken's - 256 Brook - Where I Work</td>
</tr>
<tr>
<td>3.</td>
<td>University Center - Art History Talk</td>
</tr>
<tr>
<td>4.</td>
<td>Local Parks - Where My Favorite Classes Were</td>
</tr>
<tr>
<td>6.</td>
<td>Beach Park - Summer Band Concerts</td>
</tr>
<tr>
<td>7.</td>
<td>Maintain the Co. - Go to Books - Where I Usually Eat Out</td>
</tr>
<tr>
<td>8.</td>
<td>East River Road - My Aunt's House</td>
</tr>
<tr>
<td>9.</td>
<td>453 Franklin St. - Where?</td>
</tr>
<tr>
<td>10.</td>
<td>Tapani School - 6 Mile Run - Where We Started Our School</td>
</tr>
<tr>
<td>11.</td>
<td>Baseball Field - Across the Street from My House</td>
</tr>
<tr>
<td>12.</td>
<td>Greenough Park - Many Walks and Bike Rides</td>
</tr>
<tr>
<td>13.</td>
<td>Behind Sporting Goods - To Sit and Watch the River</td>
</tr>
<tr>
<td>14.</td>
<td>Old Warehouse - My Friend's Parents House</td>
</tr>
<tr>
<td>15.</td>
<td>Southlake Mall - To Go Window Shopping</td>
</tr>
<tr>
<td>16.</td>
<td>Our Church - 1400 Second Ave.</td>
</tr>
<tr>
<td>17.</td>
<td>Lincolnwood - Walgreens Area - Our Park Sunday Drives</td>
</tr>
<tr>
<td>18.</td>
<td>Happy Jack's Bakery - Corner of South and Viking</td>
</tr>
<tr>
<td>19.</td>
<td>Village Ice Creamery - 124 West 8th St - There We Played</td>
</tr>
<tr>
<td>20.</td>
<td>First Bank Shopping - 1241 Brooks</td>
</tr>
<tr>
<td>21.</td>
<td>Western Federal Savings - Right Key to West End Country Club</td>
</tr>
<tr>
<td>22.</td>
<td>300 24th Ave. - My Aunt's House</td>
</tr>
<tr>
<td>23.</td>
<td>Miller Farms Area - Sunday Drives</td>
</tr>
<tr>
<td>24.</td>
<td>Friday Night Area - 1231 Helen - Where I Buy Concert Books</td>
</tr>
<tr>
<td>25.</td>
<td>Albertini's - Holiday Village - Great Christmas Shopping</td>
</tr>
<tr>
<td>26.</td>
<td>Galleria - 2345 N. Broadway - Great Shopping</td>
</tr>
<tr>
<td>27.</td>
<td>U.S. - School / Church Bldg. - Where My Husband Works</td>
</tr>
<tr>
<td>28.</td>
<td>410 W. Madison - Friendly House</td>
</tr>
<tr>
<td>29.</td>
<td>406 N. Ivan - Friend's House</td>
</tr>
<tr>
<td>30.</td>
<td>Lily Bell - 415 S. Indiana - Eating Out</td>
</tr>
</tbody>
</table>

Figure B-3 Image-space survey: pp. 2 & 3
The following questions complete this survey.

1. How many years have you lived in the Missoula valley?

2. How many times have you traveled outside of the USA?

3. What is your resident address? How long have you lived at this address?

4. What is your work or school address?
   Work ( ) School ( )

5. How old are you?

6. Sex?
   Male ( ) Female ( )

Thank you for your assistance in this survey. There will be a follow-up survey to this one in a short time.
Figure B-5 Image-space study: subjects A & B
Figure B-6 Image-space study: subjects C & D
Figure B-7 Image-space study: subjects E & F
Figure B-8 Image-space study: subjects G & H
Figure B-9 Image-space study: subjects I & J
Figure B-10 Image-space study: subjects K & L
Figure B-11 Image-space study: subjects M & N
Figure B-12 Image-space study: subjects O & P
Places

Desire Lines

Location of HOME WORK

INFORMATION FIELD REGION

- Core Area
- Field Area
- Islands

EMPTY-SPACE REGION

Map B-1 Image-Space study: subject A.
Places

Desire Lines

Location of HOME WORK

INFORMATION FIELD REGION
- Core Area
- Field Area
- Islands

EMPTY-SPACE REGION

Map B-2 Image-Space study: subject B
Map B-3 Image-Space study: subject C
Places

Desire Lines

Location of HOME WORK

INFORMATION FIELD REGION
- Core Area
- Field Area
- Islands

EMPTY-SPACE REGION

Map B-4 Image-Space study: subject D
Places

Desire Lines

Location of HOME WORK

INFORMATION FIELD REGION
- Core Area
- Field Area
- Islands

EMPTY-SPACE REGION

Map B-5 Image-Space study: subject E
Places

Desire Lines

Location of HOME WORK

INFORMATION FIELD REGION
- Core Area
- Field Area
- Islands

EMPTY-SPACE REGION

Map B-6 Image-Space study: subject F
Map B-7 Image-Space study: subject G
Map B-8 Image-Space study: subject H
Places

Desire Lines

Location of HOME WORK

INFORMATION FIELD REGION
- Core Area
- Field Area
- Islands

EMPTY-SPACE REGION

Map B-9 Image-Space study: subject I
Places

Desire Lines

Location of HOME WORK

INFORMATION FIELD REGION
- Core Area
- Field Area
- Islands

EMPTY-SPACE REGION

Map B-10 Image-Space study: subject J
Places

Desire Lines

Location of HOME WORK

INFORMATION FIELD REGION
- Core Area
- Field Area
- Islands

EMPTY-SPACE REGION

Map B-11 Image-Space study: subject K
Places

Desire Lines

Location of HOME WORK

INFORMATION FIELD REGION
- Core Area
- Field Area
- Islands

EMPTY-SPACE REGION

Map B-12 Image-Space study: subject L
Places

Desire Lines

Location of
HOME
WORK

INFORMATION FIELD
REGION
• Core Area
• Field Area
• Islands

EMPTY-SPACE
REGION

Map B-13 Image-Space study: subject M
Map B-14 Image-Space study: subject N
Map B-15 Image-Space study: subject O
Places

Desire Lines

Location of
HOME
WORK

INFORMATION FIELD
REGION
• Core Area
• Field Area
• Islands

EMPTY-SPACE
REGION

Map B-16 Image-Space study: subject P
Appendix C

DISTANCE-PERCEPTION STUDY

Distance-Perception Study: survey

Figure C-1 through Figure C-5 show a completed survey form and instructions for the distance-perception study.

Distance-Perception Study: maps

Map C-1 through Map C-16 show the results for the distance-perception study. Each subject is represented by two maps per page. The top map shows "Recovered Geographic Locations". An arrow indicates the displacement or location of the recovered location in reference to the actual geographic location. A short arrow indicates a small error where cognitive and geographic space nearly match. A larger arrow indicates the reverse.

The bottom map shows "Recovered Space and Cognitive Center". This map evaluates the error relative to the image-space study center of minimum aggregate travel distance. Regions are established to show where geographic space has been compressed or expanded. Arrows indicate movement greater than one standard deviation towards or away from the center. Areas shifted significantly away (greater than one standardized error) from the center are indicated by a shading of light dots and an arrow. Areas shifted significantly towards the center (less than one standardized error) are indicated by a shading pattern of
dark squares and an arrow. The former areas show geographic space that has been expanded in cognitive space while the later show space that has been contracted.
Each of the questions on the following pages contain a place in the Missoula Valley and eight other locations or places also within the Missoula Valley. Rank the 'crow fly' distances between the first place and each of the other eight places. Rank the distances in ascending order. (eg. 1 = closest place. 8 = farthest place.)

You may not use a number twice and you must answer for all the distances. If the location is an area (eg. the north side) a specific place within that area has also been mentioned (eg. old Whittier School). If you are unsure, answer to the best of your knowledge.

While completing this part of the survey please do not consult a map or another person. The eight places to which you are ranking distances remain the same for each of the questions. You should not go back to previously answered questions and change your answers.

EXAMPLE:
From Caras Park to:

Rattlesnake Wilderness  Downtown Missoula
(trail head)  (Main & Higgins)

Figure C-1 Distance-perception survey: p. 1
A. From the Airport (Terminal) to:

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rattlesnake Wilderness (trail head)</td>
<td></td>
</tr>
<tr>
<td>Downtown Missoula (Main &amp; Higgins)</td>
<td></td>
</tr>
<tr>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>East Missoula (town center)</td>
<td></td>
</tr>
<tr>
<td>Bonner Park</td>
<td></td>
</tr>
<tr>
<td>(between Evans &amp; Beverly and Ronald &amp; Hilda)</td>
<td></td>
</tr>
<tr>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Mount Sentinel</td>
<td></td>
</tr>
<tr>
<td>Kelly Island</td>
<td></td>
</tr>
<tr>
<td>(Clark Fork &amp; Blackfoot rivers)</td>
<td></td>
</tr>
<tr>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Malfunction Junction</td>
<td></td>
</tr>
<tr>
<td>South Hills</td>
<td></td>
</tr>
<tr>
<td>(Hillview Way &amp; 55th)</td>
<td></td>
</tr>
<tr>
<td>( )</td>
<td></td>
</tr>
</tbody>
</table>

B. From the middle Rattlesnake (Rattlesnake School) to:

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rattlesnake Wilderness (trail head)</td>
<td></td>
</tr>
<tr>
<td>Downtown Missoula (Main &amp; Higgins)</td>
<td></td>
</tr>
<tr>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>East Missoula (town center)</td>
<td></td>
</tr>
<tr>
<td>Bonner Park</td>
<td></td>
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<tr>
<td>(between Evans &amp; Beverly and Ronald &amp; Hilda)</td>
<td></td>
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<tr>
<td>( )</td>
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<tr>
<td>Mount Sentinel</td>
<td></td>
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<tr>
<td>Kelly Island</td>
<td></td>
</tr>
<tr>
<td>(Clark Fork &amp; Blackfoot rivers)</td>
<td></td>
</tr>
<tr>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Malfunction Junction</td>
<td></td>
</tr>
<tr>
<td>South Hills</td>
<td></td>
</tr>
<tr>
<td>(Hillview Way &amp; 55th)</td>
<td></td>
</tr>
<tr>
<td>( )</td>
<td></td>
</tr>
</tbody>
</table>

1 = closest place. 8 = farthest place.

Figure C-2 Distance-perception survey: page 2
C. From the **North side** (old Whittiker school) to:

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rattlesnake Wilderness (trail head)</td>
<td></td>
</tr>
<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>East Missoula (town center)</td>
<td></td>
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<tr>
<td>(</td>
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<tr>
<td>Mount Sentinel</td>
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<td></td>
</tr>
<tr>
<td>Malfunction Junction</td>
<td></td>
</tr>
<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>Downtown Missoula (Main &amp; Higgins)</td>
<td></td>
</tr>
<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>Bonner Park (between Evans &amp; Beverly and Ronald &amp; Hilda)</td>
<td></td>
</tr>
<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>Kelly Island (Clark Fork &amp; Blackfoot rivers)</td>
<td></td>
</tr>
<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>South Hills (Hillview Way &amp; 55th)</td>
<td></td>
</tr>
<tr>
<td>(</td>
<td></td>
</tr>
</tbody>
</table>

D. From the **University of Montana (Oval)** to:

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rattlesnake Wilderness (trail head)</td>
<td></td>
</tr>
<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>East Missoula (town center)</td>
<td></td>
</tr>
<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>Mount Sentinel</td>
<td></td>
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<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>Malfunction Junction</td>
<td></td>
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<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>Downtown Missoula (Main &amp; Higgins)</td>
<td></td>
</tr>
<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>Bonner Park (between Evans &amp; Beverly and Ronald &amp; Hilda)</td>
<td></td>
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<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>Kelly Island (Clark Fork &amp; Blackfoot rivers)</td>
<td></td>
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<tr>
<td>(</td>
<td></td>
</tr>
<tr>
<td>South Hills (Hillview Way &amp; 55th)</td>
<td></td>
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<td>(</td>
<td></td>
</tr>
</tbody>
</table>

1 = closest place.  8 = farthest place.

**Figure C-3 Distance-perception survey: page 3**
E. From Pattee Canyon (end of pavement) to:

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rattlesnake Wilderness (trail head)</td>
<td>Downtown Missoula</td>
</tr>
<tr>
<td>East Missoula (town center)</td>
<td>Bonner Park (between Evans &amp; Beverly and Ronald &amp; Hilda)</td>
</tr>
<tr>
<td>Mount Sentinel</td>
<td>Kelly Island (Clark Fork &amp; Blackfoot rivers)</td>
</tr>
<tr>
<td>Malfunction Junction</td>
<td>South Hills (Hillview Way &amp; 55th)</td>
</tr>
</tbody>
</table>

F. From West Missoula (North & Clements/east of Maclay bridge) to:

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rattlesnake Wilderness (trail head)</td>
<td>Downtown Missoula</td>
</tr>
<tr>
<td>East Missoula (town center)</td>
<td>Bonner Park (between Evans &amp; Beverly and Ronald &amp; Hilda)</td>
</tr>
<tr>
<td>Mount Sentinel</td>
<td>Kelly Island (Clark Fork &amp; Blackfoot rivers)</td>
</tr>
<tr>
<td>Malfunction Junction</td>
<td>South Hills (Hillview Way &amp; 55th)</td>
</tr>
</tbody>
</table>

1 = closest place.  8 = farthest place.

Figure C-4 Distance-perception survey; page 4
G. From Southgate Mall to:

<table>
<thead>
<tr>
<th>Destination</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rattlesnake Wilderness</td>
<td></td>
</tr>
<tr>
<td>(trail head)</td>
<td></td>
</tr>
<tr>
<td>Downtown Missoula</td>
<td></td>
</tr>
<tr>
<td>(Main &amp; Higgins)</td>
<td></td>
</tr>
<tr>
<td>East Missoula</td>
<td></td>
</tr>
<tr>
<td>(town center)</td>
<td></td>
</tr>
<tr>
<td>Bonner Park</td>
<td></td>
</tr>
<tr>
<td>(between Evans &amp; Beverly</td>
<td></td>
</tr>
<tr>
<td>and Ronald &amp; Hilda)</td>
<td></td>
</tr>
<tr>
<td>Mount Sentinel</td>
<td></td>
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<tr>
<td>Kelly Island</td>
<td></td>
</tr>
<tr>
<td>(Clark Fork &amp; Blackfoot</td>
<td></td>
</tr>
<tr>
<td>rivers)</td>
<td></td>
</tr>
<tr>
<td>Malfunction Junction</td>
<td></td>
</tr>
<tr>
<td>South Hills</td>
<td></td>
</tr>
<tr>
<td>(Hillview Way &amp; 55th)</td>
<td></td>
</tr>
</tbody>
</table>

H. From Blue Mt. Recreation area to:

<table>
<thead>
<tr>
<th>Destination</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rattlesnake Wilderness</td>
<td></td>
</tr>
<tr>
<td>(trail head)</td>
<td></td>
</tr>
<tr>
<td>Downtown Missoula</td>
<td></td>
</tr>
<tr>
<td>(Main &amp; Higgins)</td>
<td></td>
</tr>
<tr>
<td>East Missoula</td>
<td></td>
</tr>
<tr>
<td>(town center)</td>
<td></td>
</tr>
<tr>
<td>Bonner Park</td>
<td></td>
</tr>
<tr>
<td>(between Evans &amp; Beverly</td>
<td></td>
</tr>
<tr>
<td>and Ronald &amp; Hilda)</td>
<td></td>
</tr>
<tr>
<td>Mount Sentinel</td>
<td></td>
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<tr>
<td>Kelly Island</td>
<td></td>
</tr>
<tr>
<td>(Clark Fork &amp; Blackfoot</td>
<td></td>
</tr>
<tr>
<td>rivers)</td>
<td></td>
</tr>
<tr>
<td>Malfunction Junction</td>
<td></td>
</tr>
<tr>
<td>South Hills</td>
<td></td>
</tr>
<tr>
<td>(Hillview Way &amp; 55th)</td>
<td></td>
</tr>
</tbody>
</table>

1 = closest place. 8 = farthest place.
Map C-1 Distance-perception study: subject A
Map C-2 Distance-perception study: subject B
Map C-3 Distance-perception study: subject C
Map C-4 Distance-perception study: subject D
Map C-5 Distance-perception study: subject E
Map C-6 Distance-perception study: subject F
Map C-7 Distance-perception study: subject G
Map C-8 Distance-perception study: subject H
Map C-9 Distance-perception study: subject I
Map C-10 Distance-perception study: subject J
Map C-11 Distance-perception study: subject K
Map C-12 Distance-perception study: subject L
Map C-13 Distance-perception study: subject M
Map C-14 Distance-perception study: subject N
Map C-15 Distance-perception study: subject O
Map C-16 Distance-perception study: subject P
Appendix D

AFFECT STUDY

Affect Study: survey

The survey and sample map used for the affect study can be found in Figure D-2 through Figure D-5. Instructions, a reduction of one of the personalized maps, and one of the 16 pages from the survey are reproduced. The format for the other 15 pages is similar. The subjects were supplied with maps at a scale of 1:24000 for the study.

Affect Study: standardized survey responses

Figure D-6, Figure D-7, Figure D-8 and Figure D-9 show how each of the sixteen subjects responded to the evaluation factor questions. Some subjects tended to bias their answers towards the like-approach response while others towards the dislike-avoid response. Standardization of the responses allows for a comparison of the results. The following graphs show how each subject was biased. The dot represents a neutral (or 4 on the questionnaire) response while a 0 on the horizontal scale indicates the standardized neutral response. For example subject A responded to the right (or dislike side) of a neutral response. This means that overall their responses indicated a slight dislike of places in the test. To adjust for this shift the subject's scores have been adjusted so that the dot now indicates a neutral response. Figure D-1 shows the standardized scores for all the subjects. Note that when all the scores have been standardized the mean is now a neutral response or 0. The box indicates the
extreme, quartile and median scores. Overall there is a slight bias towards the like side of the scale while there is a tendency towards a more extreme response on the dislike side.

**Affect Study: maps**

Map D-1 through Map D-16 show the results for the Affect Study. Each subject is represented by two maps. The top map shows the results for activity factors while the bottom map shows results for evaluative factors. Potency factors were not mapped. Areas where the subject indicated an evaluative preference to approach are indicated with no shading and areas preferred to avoid are indicated with dark boxes. On the activity maps areas to be fast are indicated with dark boxes while slow areas are shown with no pattern. These maps are made from the actual, not standardized, scores. The inly maps which
appeared at the end of Chapter 5 reflect standardized scores. Note that these maps use a different legend.
The Place With Which We Live

Part 3

The purpose of this study is to measure the meanings and qualities of certain places in the Missoula Valley. You are being asked to judge these places against a series of descriptive scales. In taking this test, please judge the places on the basis of what they mean to you.

Each question presents a place and a scale. There are 12 questions on each page, all referring to a letter on the accompanying map. Take a look at the map at this time. You will find 16 places, each marked with a letter. The letter refer to the general area covered by the circled letter. You should let the location on the map call to mind your own unique set of feelings for this place and area. If the letter is next to, but not exactly over your home, you should answer the questions as if the place referred to was your home and the area, your neighborhood.

Sometimes you may feel that you have had the same scale and place before on the test. This is not the case; every question is different. So do not look back and forth throughout the test. Also, do not try to remember how you marked similar items earlier in the test. Mark each item with a separate and independent judgement. Work at a fairly high speed, without worrying or puzzling over individual items for long periods. Consult the map continually so as to be clear concerning which location in the Missoula Valley is involved with the question. It is your first impressions that are wanted.

Complete the questions as quickly as possible. If meanings or qualities of certain places become 'fuzzy' in your mind put the test aside for a while and do something else. Complete the questions in the setting you used while completing parts one and two of this survey.

Several examples follow.
EXAMPLES

If you feel that the place is very closely associated with one end of the scale, you might place your mark as follows:

avoid approach

If the place seems quite closely related to one side as opposed to the other, you might check as follows:

avoid approach

If the place seems only slightly related to one side as opposed to the other, you might check as follows:

avoid approach

If you consider the scale completely irrelevant or both sides equally associated, you would check the middle of the scale:

avoid approach

Thank you for helping in this project.

Figure D-3 Affect survey: page 2
<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. dangerous</td>
<td>safe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. profane</td>
<td>sacred</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. unpleasant</td>
<td>pleasant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. like</td>
<td>dislike</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. bad</td>
<td>good</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. tensed</td>
<td>relaxed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. active</td>
<td>passive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. quiet</td>
<td>loud</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. uncomfortable</td>
<td>comfortable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. slow</td>
<td>fast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. approach</td>
<td>avoid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. dirty</td>
<td>clean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure D-4 Affect survey: page 3**
Figure D-5 Affect survey: map
Figure D-6 Affect study: subjects A, B, C & D.
Figure D-7 Affect study: subjects E, F, G & H.
Figure D-8 Affect study: subjects I, J, K & L.
Figure D-9 Affect study: subjects M, N, O & P.
Approach

Neutral

Avoid

Fast

Neutral

Slow

Map D-1 Affect study: subject A
Map D-2 Affect study: subject B
Map D-3 Affect study: subject C
Map D-4 Affect study: subject D

- Approach
- Neutral
- Avoid

- Fast
- Neutral
- Slow
Approach
Neutral
Avoid

Fast
Neutral
Slow

Map D-5 Affect study: subject E
Map D-6 Affect study: subject F
Map D-7 Affect study: subject G
Map D-8 Affect study: subject H
Map D-9 Affect study: subject I
Map D-10 Affect study: subject J
Map D-11 Affect study: subject K
Map D-12 Affect study: subject L
Map D-13 Affect study: subject M
Map D-14 Affect study: subject N
Map D-15 Affect study: subject O
Map D-16 Affect study: subject P
BIBLIOGRAPHY


