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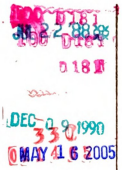

TOWARD A HUMAN ECOLOGICAL APPROACH OF ARCHITECTURE AND URBAN DESIGN

By

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ABSTRACT

TOWARD A HUMAN ECOLOGICAL APPROACH
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This thesis addresses the problem of the lack of cooperation between designers from the environmental design fields such as architecture and urban design, and researchers from the emerging behavioral science. This problem stems from a theoretical and professional gap between the two fields. By focusing on the theoretical gap which resulted in view of the relationship between human behavior and the physical environment, this thesis has suggested a reorientation of the designers deterministic attitude (i.e. the physical environment determines behavior) toward a human ecological approach. By redefining architecture and urban design as a means for designing adaptive spaces, a synthesis between the design fields and behavioral science has been proposed as a base for a conceptual framework that is aimed to close the theoretical gap. Although this thesis does not propose a closing of the existing professional gap between designers and researchers, it indicates the need for further attention to this problem.

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INTRODUCTION

Idea

The idea of this thesis is derived from the emerging awareness of the study of the relationship between human behavior and the physical environment. This study has shown a rapid development in the last decades, particularly in the emerging field of behavior science. However, the implications of such a study lies in the hands of the fields of the environmental design, such as architecture, urban design, interior design, and industrial design. Therefore, there are two major fields for which, this study is important. On one hand, there is a group of researchers from social science fields such as psychology, anthropology, geography, and sociology, who, through the initiation of the multi-discipline behavior science, are concerned by human behavior and the physical environment. On the other hand there are the designers from the environmental design fields.

Designers of the built-environment, although practicing in different fields, have one common thing that relate them to the study of behavior-physical environment. That is; they deal with changing a specific physical environment for meeting specific human activities. Therefore, it is quite important for the designer in

general to know more about the relationship between the physical environment and behavior, if he wants to design the most appropriate environment. In this extent, the designer of the built-environment, whether he is an architect, urban designer, city planner, or interior designer, is equally responsible for considering the importance of the behavior-environment relations, particularly when a physical design is taking place.

Although the study of behavior and the physical environment is important for both the behavior scientists and the environmental designers, they have contributed to it quite differently. While the behavioral scientists and researchers have been adjusting and shifting their theoretical attitudes and orientations, based on research findings, the environmental designers have been reluctant to consider such reorientations. In brief, the views of the relationship between human behavior and the physical environment can be summarized as follows:

1. Deterministic approach: That is the physical environment determines human behavior; in other words a specific behavior is expected to result in a specific built-environment.

2. Possibilistic approach: That is the physical environment provides possibilities and constraints, within which people make choices, the criteria for such choices are mainly cultural.

3. Probablistic approach: That is the physical environment does affect people's behavior not in terms of determining or generating it, rather in terms of choices, based on criteria attributed more to the physical setting.

The designers attitude reflects, to a great extent, the deterministic approach, in that whenever a space or a structure is designed there is always the assumption of expecting, certain, desired, behavior to result. Moreover, whether this assumption happens or not, the designers do not bear responsibility for evaluation or follow up. This task is left to researchers, who on the other hand, have extended their theoretical views to the probabilistic approach which has led to the emerging of what is called the ecological approach. In other words, in viewing the behavior-environment relations, it is important to consider the context of this relationship, including culture.

Problem

The problem this thesis addresses is the lack of cooperation between designers from the environmental design fields--such as architecture, urban design, and city planning--and researchers from behavior science, particularly in regarding the relationship between behavior and the built-environment. This problem has two dimensions. First, there is a theoretical gap between designers and researchers in those fields. Second, there is a professional gap.

The theoretical gap, as indicated in the previous discussion, stem from the designers' reluctance to change the deterministic attitude toward the built-environment behavior relations. On the other hand, the professional gap is a result of the difference in the intellectual styles and goals of the designers and researchers. While researchers are seeking the knowledge of the relationship between behavior and the built-environment, for example, designers are seeking the control of this environment. In other words, designers, in general, are action-oriented, and behavior scientists are research-oriented. This difference in itself does not mean that there is a gap, unless if there is no cooperation between the two professions. This lack of cooperation between the designers and the researchers, particularly at the professional level, can also be attributed to the kind of the social, political, and economic environment within which the two types of professions operate. This is what one may call the "real world". Although the "real world" differs from one designer to another, the problem is always the same, in that there is the gap between the designer of a specific environment and the actual users. The designers' employer (who pays for the service) is in most cases, a developer, who is looking forward to making a certain profit, that is not necessary by meeting the needs of the actual users. It is a typical case for a designer not to

meet or even know any of the users of his designed setting, and in extreme cases he might not see the physical setting at all. The researchers, on the other hand, are employed, in most cases by academic or public institutions whose goal is to increase the body of knowledge of the particular area of research conducted, regardless of whether or not the suggested implication of the findings are actually considered by designers of the built-environment.

Another way to state the problem with its different, although related, dimensions is, in terms of the relationship between the physical-environment and human behavior, where there is a gap between the designers in the environmental design fields, and researchers in the behavior science fields. This gap has two dimensions; one is theoretical and the other is professional. This has led to a lack of cooperation between the two professions.

Scope

The scope of this thesis is extending throughout two major fields--environmental design and behavioral science. While the environmental design includes a range of disciplines such as architecture, urban design, and city planning, the focus within this field is on the aspect of the physical design of the built-environment. In this extent, the different design disciplines are used throughout the thesis as to indicate to this design aspect. On

the other hand, the behavioral science includes another range of disciplines from the social science, particularly those disciplines which deal with human behavior by one way or another. Such disciplines are, for example, geography, anthropology, psychology, and sociology. The particular focus on the behavior science, in this thesis, is on its contribution to the study of the relationship between behavior and the physical environment.

The key focus, then, is on design and the issue or relationship between behavior and the built-environment. In other words, as was indicated above, the environmental design fields have a deterministic attitude in viewing this relationship. On the other hand the behavioral sciences' current approach is an ecological one. Therefore by reconsidering the design deterministic approach a conceptual framework can be developed between the two fields. The purpose of this conceptual framework is to close the theoretical gap between the designers and the behavioral scientists, particularly, in view of the behavior-built-environment relation.

This gap is not the only reason for the problem of lack of cooperation between the designers and the behavioral scientists. The professional gap accounts, as well, for the same problem. However, the thesis is limiting itself to the closing of the theoretical gap. In the mean time

some dimensions of the professional limitations and gap within and between the design and behavior science will be discussed.

Methodology

The methodology used in this thesis is an extensive review of the literature pertaining to the problem of the theoretical gap between behavioral scientists and environmental designers, particularly in view of the relationship between behavior and the physical environment. This review has even extended within each discipline to include any related issue and concept that may help develop the thesis.

This has already enabled the research of this thesis to lay out a variety of theoretical and philosophical orientations which resulted in the development of other ideas and concepts used in the following chapters. Without doing this, a synthesis between various disciplines of the behavior science field and the environmental design field, would never have been feasible.

Purpose

The purpose of this thesis is tc propose a possibility for an alternative, ecological, approach to the deterministic attitude of the environmental design fields toward the issue of behavior- built-environment relation. This approach will, possibly, bridge the theoretical gap between the design and the behavior science fields. In

turn, this will contribute to the study of the behavior-environment in general by considering the implications of the current view of the behavior science fields which is an ecological, humanistic one. In addition, as the researchers will have an access to the initial design problems and questions the designers will be aware of the possible implication of the research findings in this area of study. This will help designers to design better physical-environment for people.

Organization

This thesis is devided into three chapters.

The first chapter will be looking at the question of how does the built-environment relate to human behavior? The answer of this will be a review of the different theoretical attitudes and philosophical orientations that led to them. The chapter will then extend the review with focusing on the current view of this relationship. This theoretical review, although will use a range of different disciplines, will particularly focus on the emerging behavioral science field.

The second chapter will, then, shift the focus to the design fields in an attempt to reconsider the deterministic attitude held by designers, by looking at the theoretical limitations. In doing this the chapter will discuss the possibilities of reconsidering the meaning of

rationality in the design process. The chapter then will discuss the possibility for defining architecture and urban design in terms of cultural adaptation.

The third chapter will attempt to develop a synthesis between design and behavioral science, in the light of architecture and urban design defined as cultural adaptation. The synthesis will be at a general theoretical as well as a specific conceptual level. The chapter will end by an attempt to develop two models. One is a conceptual framework model aimed to close the theoretical gap between the environmental design fields and behavior science. The second model is a design process one that has two schemes. The first scheme will represent occasions for cooperation between designers and researchers in the design process. The second scheme will indicate the possibility for designing with people.

CHAPTER I

HUMAN BEHAVIOR AND THE PHYSICAL ENVIRONMENT: THEORETICAL ORIENTATIONS

This chapter will commence the thesis by introducing an overview of the different theoretical orientations concerning the relationship between human behavior and the physical environment. The chapter will begin with a discussion of the philosophical orientations which has led to the various theoretical attitudes in viewing this relationship. This will lead to the general theoretical limitations within the disciplines undertaking behavior environment study, which are integrated in the emerging behavioral sciences. The discussion will then focus on some specific concepts of man-built environment relation which are interpreted to be the bases of the behavior physical environment relation. This will be followed by introducing the ecological view as it represents an important emerging theme of viewing the whole notion of behavior-environment interactions. Finally, the chapter will end by indicating the importance of culture particularly when viewing behavior in an ecological sense.

One of the fundamental questions, to start with, is; in which way does the physical environment relate to human behavior? This question is:

> . . . an extremely difficult question to answer since the evidence is often difficult to compare, is contradictory and there is no consenses of generally accepted theoretical position. (Rapoport, 77:p2).

According also to Rapoport, there is a range of theoretical attitudes towards the answer of the question, from; (1) Environmental Determinism; (2) Possibilism to (3) Probabilism.

The environmental determinism attitude is, briefly, that the physical environment determines human behavior. This attitude is stronger in the field of planning and design, particularly in architecture, however, it also existed in cultural geography and anthropology. The possibilism approach is, "that the physical environment provides possibilities and constraints within which people make choices based on other, mainly cultural, criteria" (Ibid., 77:p2). This attitude is, much as in geography, a reaction to the determinism one. The current view, the probabilism, is stronger in the field of environmental design research. It is a view of that the physical environment does affect the people's behavior but not in terms of determining it rather in terms of choices based on criteria attributed to the physical setting. In essence this view rejects the idea of that the physical environment could generate or determine activities or behavior.

Although there is a large number of disciplines involved in these attitudes, the most crucial of all is the environmental design in general and architecture and planning in particular. They are the disciplines that actually determine the final product of the built-environment--whether it is assumed to affect behavior or not. Therefore, before extending the view over these disciplines, it is important to lay out the state-of-the-art of the philosophical grounds of the above attitudes. By doing that, in the following section, the current evolved view will then address itself.

Philosophical Orientations

Confronting to the question of the ways people know or image their environment, I will try to go back to more general context of how knowledge in general is attained, in other words how an object is known by a subject. In this case, it is important to broaden the focus, for a while, to the general philosophical positions concerning the object-subject question. This overview of theoretical or rather philosophical positions can be discerned into "three fundamentally different ways in which the relationship between environment and behavior has been conceptualized" (Moor and Golledge, 76:p12). These three directions are;

(1) empiricism and environmental; determinism
(2) rationalism and nativism, and
(3) interactionalism and constructivism

Each of these classes of theory is based on different assumptions about the "organism, what factors influence behavior, the nature of reality, and for those which include treatments of knowledge, the way in which knowledge is attained" (Ibid., 76:p12).

According to Moore and Golledge (76), there are two extremes concerning behavior and environment between which all these theories are stretched. One extreme is that external environment entirely determines behavior; and the other is that behavior are entirely determined by internal biological and hereditary forces.

Empiricism and Environmental Determinism

The empiricism was first articulated by the eighteenth century British philosophers Locke, Berkeley, and Hume. While the environmental determinism is a twentieth century school, it is based on the positivism and neopositivism expressed in the work of Comte, Mill, Carnap, Wittgenstien, Reichenbach and others (see Bochenski, 1966) (Moore and Golledge, 76:p12). Both the empiricism and the environmental determinism agreed upon that behavior in general, and knowledge in particular, are strictly under the control of the environment and that the main and only source of knowledge is sensation through which "one only can grasp singular and material events" (Ibid., 76:p12). They, on the other hand, disagree upon

the issue of the laws; the empiricism defined them as posteriori and the neopositivism as periori to experience (Ibid., 76:p12).

In this theoretical context, extended to the twentieth-century environmental determinism, behavior is defined as consisting of patterns of responses and is assumed to be determined by the environment impinging on a passive organism and selecting and reinforcing particular responses. In other words, the environment acts on people and we, then, are the product of the environment. There are, in fact, sub-classes of theories that disagree on defining other consequential issues such as knowledge and representations. These are three major schools: strict stimulus-response (S-R); mediational S-R; and cognitive behaviorist theories (Moore and Golledge, 76:p12). In this view, the environment is treated as real, objective and normative existance totally independent of the observer. This view was also, categorized as "man reducible to environment" (Overton and Reese, 77:p13), in which the basic metaphysical assumption of the primacy of the material world is the grounds.

> This is, thought and actions of man are held to be determined by and hence to derive from an independent, stable material reality. (Ibid., 77:p13).

Rationalism and Nativism

The alternative opposition to empiricism and determinism is the position of rationalist and idealist like Plato, Descartes, Spinozo, and Leibniz, which started by the nativist contention that;

> . . . knowledge is given immediately as an innate idea, before experience; it is a basic act of pure thought that opens all reality to us. Sensation in this view, gives us nothing but images of individual, particular things; that which is designed by them is given not by sensation but by innate ideas arising from our inherent powers of intellection. (Moore and Golledge, 76:p13).

This view can also be categorized as "environment reducible to man" (Overton and Reese, 77:p15), that what is commonly assumed that the environment is held to be itself merely a construction of man. As such, behavior is defined as the expression or projection of inherent (genetic and biological) factors in the contest of a specific environment. This second trend of theories is, therefore, resting on the other extreme, opposite to the first environmental determinism one.

Interactionalism and Transactionalism

As expected from theoretical streams, the third alternative to both opposite extremes is one which tries to synthesize, and bridge the gap, between the two polarized views on the subject-object question.

This position is that of the interactionalism and transactionalism. A landmark of this position was Kant's

fundamental distinction between the matter (or content) of knowledge and the form of knowledge. The first corresponds to sensation and the second causes the matter to be arranged in a certain order. The "matter" of knowledge is given through experience (as believed in the empiricism), while the form of knowledge, parallel to the rationalism, "is given a priori" (Moore and Golledge, 76:p13). The form of knowledge, as independent from the environment, is assumed by Kant to be universal and constant.

> For Kant, there were only two pure forms of intitution - space for the outer senses and time for the inner. All other contents of reality are experienced in the context of space and time. (Ibid., 76:p14).

Interestingly, while both empiricism and rationalism, although fundamentally opposite, agreed upon the premise that one can understand the ultimate nature of reality,

> Kant argued that, since there is no way for us to apprehend the nature of 'reality' except through man, it is impossible to completely seperate the process of knowing from the result and knowledge . . . that there can be no complete understanding of truth in either sense or reason; thus, instead of knowledge ever representing exactly what is real, what we take to be real is a product of the act of knowing - that is, a 'construction of thought'. (Ibid., 76:p14).

In this respect, the idealism, neo-Kantians represented one pole of assumptions based upon denial of knowledge through empirical methods and complete primacy of mind contrary to both the empiricism and rationalism with their consequential theoretical echoes.

However, neo-Kantian theories of both philosophy and psychology moved to a rather interactive position, in which the key word "grasp" was changed into "active construction" of objects regarding knowledge of reality in general and environment in particular. In this view, the subject (man) plays an active role with the object (environment). The result is that knowledge is the extent to which the subject can construct the object. This view, in this respect, is also parallel to that of the interactional and transactional positions on environment-behavior relations. Experience and behavior are assumed to be influenced by intraorganismic and extraorganismic factors operating in the context of ongoing transactions of the organism-in-environment. Behavior can then be attributed as a function of either biological or of environmental factors, and it is more than being the summation of them. A definition of behavior, therefore, is that it is an interaction of biological (sensation), personality. Socio-cultural and environmental factors each in the context of the other and the context of their mutual interactions. This view, in general, can also be called, "man and environment as interdependent systems" (Overton and Reese, 77:p15) in which "two interdependent systems--man and environment--reciprocally interact and exert formative influences on each other" (Ibid., 77:p15).

Theoretical Limitations

These three philosophical orientations of the object subject question, as briefly layed out above, to a certain extent, represent the walls of the context of behavior, cognition, and perception theory. The underlying point of the subject-object question in this context is the concentrating on how one object is perceived, or known, by a subject. This point, until very recently, was the obstacle and limitation for an environmental perception study to be undertaken. A great example of this limitation is the Gestalt perceptual theory, which while having explicit interest in the context, was primarily developed through the study of form and object perception (Ittelson, 73:p2).

Ittelson (73) attributed this theoretical limitation to that although some interest in the larger environment is expressed in some opposing theories, their extremely narrow definition of behavior and rigid concept of experimental procedures,

> . . . has driven the study of perception almost exclusively into the highly contrived laboratory situation, where object perception is virtually the only avenue open for study. Thus, in the history of experimental psychology and overwhelming bulk of perception research has been carried out in the context of object perception, rather than environment perception, with the findings of the former providing the basis for understanding the latter. (Ibid., 73:p3).

This was a major phenomena, in the past 100 years, in the psychological theories and views of perception.

> As a result the investigation of perception has lost the essential esthetic unity without which any pursuit leads to chaos, rather than resolution. (Ibid., 73: p3).

Therefore, the philosophical question of the object-subject with all its multi-dimensions and assumptions can be seen as the dilemma of the psychological theories of perception. For centuries sensation, only, was considered as a base for perception in what Lang (74:p99) called sensation based theories. In contrast, what he called information-based perception theory as developed by psychologists such as James J. Gibson and Eleanor J. Gibson (Lang, 74) which focuses not only on how the data identified with the object of perception are delivered in an organized way but on the discovery of how we process phenomenal information and the relationships that come to exist within it. It is not a denial of sensory experience,

> . . . but patterns within the entire context provided by ambient light is said to be the basis of visual perception rather than the defining qualities of particular sensation. (Ibid., 74:p99).

Whether sensory based theory, or information-based theory, architects have been reluctant to take any avenue of theories which can be useful as to change their assumptions of one way causal relationship from environment to man or object-on-subject effects (Ibid., 74:p100). This, in turn, has not encouraged the researchers to investigate

and test their assumptions and hypothesis about this relationship the thing that accounts for another kind of theoretical limitations.

> In analytical research work it is of the utmost importance to know, at an early stage of the investigation, whether a subordinate element stands in a relation of mutual causal influence with all other parts of the system, or whether it is an unchangeable independent structure, influencing the whole by 'one-way' causation. (Lorenz, 68:p127).

Aspects of Man-Built Environment Interactions

The previous sections discussed the philosophical orientation of the theory of behavior-environment in the behavioral science fields. If one considers that these are the general contributions of these fields to the study of behavior environment, this section, by looking at some aspects of the current trend, can be specific contributions. The focus in this section will be on some of these specific concepts of the man-environmental interaction. In the last section it was concluded that the current trend, despite the limitations in the behavioral science is the transactional, interactional approach which supports the importance of the context (larger environment) in its broad definition of behavior as the process of mutual interaction between man and the environment. Human aspects interacting in this process was synthesized to be attributed to biological (sensation) and personality

(socio-cultural) factors. It is also important to note that the fundamental assumptions, upon which this current trend is based, according to Rapoport's review, are;

(1) Knowing, perceiving, and evaluating the environment is a dynamic process whereby information from the external environment is constantly being received, perceived (selected), and organized (based on evaluation) and used to help individuals operate. This process with its three facets, is what can be broadly called perception (Rapoport, 77:p30). In this sense, perception, with its different meaning, is inseparable component of behavior.

(2) Subjective conceptions of the environment are "the ways in which people understand, structure and learn the environment . . . this might better be called ENVIRONMENTAL COGNITION (Ibid., 77:p31). The variations of these subjective conceptions between different individuals are due to differences in past experiences about the environment and also due to differences in their socio-cultural environments, but not due to biological differences (Moore and Golledge, 76:p11).

(3) The biological differences account, then, for the different perceptual conceptions among different individuals at a given time. These are merely sensory information perceived differently by different (biologically) individuals. This is, simply, to assert that we perceive the environment differently.

(4) The combination of both the perceptual and cognitive conceptions are accounting for the process by which people make choice and select. "A better term might be ENVIRONMENTAL EVALUATION OR PREFERENCE" (Rapoport, 77:p31).

(5) Finally, information extracted from large-scale external environments exist in some type of psychological space, not like the geometrical one, but can help to reproduce the same physical space (by training overtime), (Moore and Galledge, 76:p10). "This is the space in which configurations, characteristics, and meanings about the world are held as mental images or cognitive representation" (Ibid., 76:p10).

Environmental Perception, Cognition, and Evaluation

The above assumptions underline Rapoport's (77:p37) position about the importance separating the different, confusing, meanings of perception. The three meanings, as presented above, while they form a continuum, as in Figure 1, "it seems possible to separate them so that a particular process belongs more or less in one of these categories" (Ibid., 77:p31).

There are two, relating, although conceptually different, meanings of the term environmental cognition (Rapoport, 77:p108). One is based on psychological

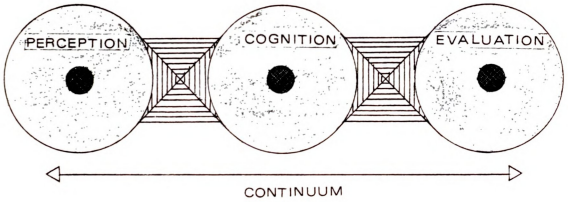

Figure 1.--The Perception Continuum

SOURCE: Rapoport, 77:p31

premises which stress the knowledge of the environment, while the other is based on anthropological views which tend to stress that "cognitive processes are concerned with making the world meaningful and that there are different ways in which meaning can be given to the world" (Ibid., 77:p108). In other words, the underlying objective of the two views is investigating two fundamental sets of variables, the first is biological (for psychology) and the second is cultural (for anthropology).

> Cognition, from the latin word for 'getting to know' refers both to the process of knowing and understanding and the product - the thing known. (Ibid., 77:p109).

The concept of cognition then, as a way of mediating information about the environment, is very useful for the behavior research. Figure 2 shows a diagram suggested by Rapoport (77:p109), to illustrate the cognitive process.

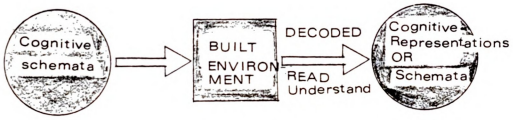

Figure 2.--The Cognitive Process

SOURCE: Rapoport, 77:p109

The process is assuming that the physical or the built-environment is the physical expression of the cultural cognitive categories "which, if the environment is meaningful, produce the appropriate and intended cognitive schemata" (Ibid., 77:p109). These cognitive representations or schemata are the ones known as mental maps which in general terms governs the process of imaging and since they involve both spatial and temporal schemes, they, thus guide one's orientation.

The term perception, in most of the social science literature, is the most confusing one. However, as shown above, Rapoport (77) seems to be aware of this confusion and accordingly made the distinction between perception and cognition as follows;

> It is possible to distinguish between perceptual cognition, or knowledge of environment, and symbolic cognition or knowledge about the environment (Gibson,

> 1968). The former is perception, the direct sensory response to things and places, while in the latter, cognition, the information is precoded and may come from indirect sources. While all people see the world more or less the same way (Gibson 1968, p. 321) they structure it and evaluate it quite differently. (Rapoport, 77:p178).

As such, perception is experiencing the environment through, mainly, sensory, direct, interactions, while cognition is knowing and comprehending the environment by relaying, in most cases, on pre-coded information and past experience. Both concepts are involved in everyone's daily interactions with the environment. While people want to understand (comprehend) the built-environment cognitively, they also wish to experience it. By doing this, although seeming contradictive but are complementary to one another, criteria are used in the process of evaluating the environment. One is clarity (based on cognition) and the other is complexity (based on perception). The nature of perception, therefore, is a complex multi-sensory one. It also depends, to a certain extent, upon memory, cognitive representation, and culture.

The Ecological View

The previous sections of this chapter have already indicated some theoretical concepts of the nature of man-environment interactions. This section will deal with another dimension, that is how can the relationship between behavior and the physical environment be viewed in an

ecological context. In this respect, Roger Barker (69) has developed his famous concept "behavior settings". An important point to note, as Barker indicated in his work, is that both the physical and the social environment impinge on behavior. Barker summarized his attributes of the relationship between behavior and environment by defining the concept of behavior setting as follows:

1. A behavior setting consists of one or more standing patterns of behavior, which uniquely define the behavior pattern in terms of both time and space.
2. Both man-made parts of a town and natural features can comprise the milieu of, and thus affect, the behavior setting.
3. The milieu encompasses, environs, and encloses behavior and, hence, can be used to describe that behavior setting.
4. The milieu (environment) is similar in structure to the behavior, hence they affect each other in an essential way.
5. The environment-behavior parts are so relating to each other, if called synomorphs, structurally a behavior setting is a set of such synomorphs.
6. While behavior and environment are related to, and affecting each other they maintain a specific degree of independence.

The underlying message Barker tried to convey was that while behavior is an inescapable component interrelated with the environment (the milieu), it has not been the subject of the physically oriented environmental designers. Perhaps one, admitted, difficulty in considering behavior, is that the environment affects behavior in an important way. But this environment is experienced by each individual differently. Thus, predicting the environment-behavior

relation is quite a complex task--that will involve basic theoretical consensus as well as methodological research cooperation among a range of different disciplines.

Bonni Morrison (74) pointed out at the importance of looking at the behavior-environment relation in terms of three main environments; (1) Natural Environment, (2) Man-Made Environment, (3) Behavioral Environment. Figure 3 summarizes the inter-relationships between these three environments.

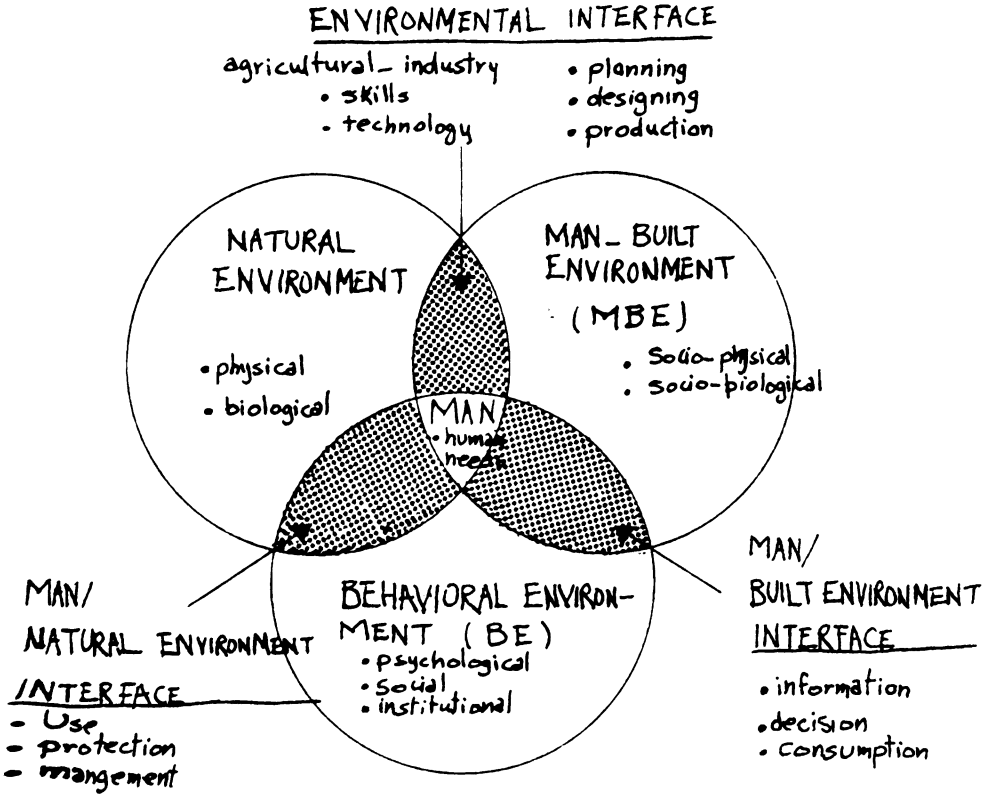

Figure 3.--Behavior-Environmental Inter-Relationships

SOURCE: Morison, 74:p176

This model, although a very general framework that does not propose any specific issue, is useful to look at as a "conceptual tool". Its primary premises are: (1) the need to use a systematic approach that is a complete human ecological perceptive in order to provide a broad and holistic view of a total system; (2) this view is important to consider in times of great specialization and fragmentation of knowledge; and (3) no part of the man-behavior-environment system, as a complex framework, is an independent entity.

Edwin Willems wrote, supporting this ecological approach of dealing with behavior as behavior-environment units, that,

> . . . without this percepective, the bits and pieces which we study so frequently in experiments and with which we tinker so indiscriminately in psychotherapy, behavior modification, and behavior pharmacology are all abstractions that have lost much of their scientific and practical usefulness because they are seperated from the contextual interdependencies of everyday life. (Willems, 77:p25).

This ecological approach emerged in both the field of psychology and of anthropology. The "ecological psychology has emphasized the need to study behavior in more molar and naturalistic context" (Berry, 80:p83). While, "a similar movement within anthropology was developing the point of view that the forms which a culture evolves can and must be understood as adaptation to its habitat" (Ibid., 80:p83). This movement is called cultural ecology.

The ecological psychology, as Barker's work discussed above, was pushed further to a cross-cultural psychology, so to increase "the range of independent variables". In fact this shift toward accounting cultural variable in an ecological context indicates the failure of the traditional psychology that looks at behavior from a narrow perspective. As a response to this shift, Berry (80) has introduced a model of "ecocultural psychology" in an attempt to incorporate ecological, cultural, acculturational, and behavioral variables into a single model, Figure 4.

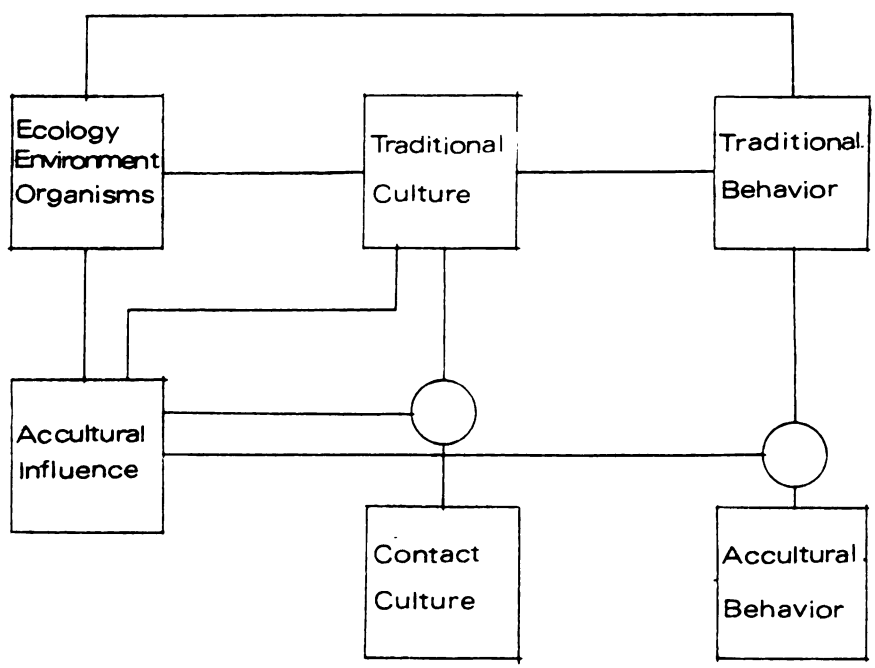

Figure 4.--An Ecological-Cultural-Behavioral Model

SOURCE: Berry, 80:p86

The underlying idea of this model is to bring the cultural and ecological elements together, as they both are related to behavioral elements. These three basic elements were defined by Berry (80), as follows:

(1) Ecological: interactions between human organisms and their habitat
(2) Cultural elements: group-shared patterns of behavior which are adapted to the group's habitat
(3) Behavioral elements

In parallel, there is another set of elements,

> . . . which is introduced through major contact with technologically dominant societies, includes the acculturative influences themselves (operating mainly through urbanization and education), the contact culture (a culture no longer simply in adaptation to its habitat, but now also under these acculturative influences), and acculturated behavior (consisting of 'shifts' in behavior from previous levels, and 'acculturative stress' behaviors which are novel and mildly pathological). (Ibid., 80:p85).

The relationships between all these elements are probabilistic (rather than deterministic) and correlational (rather than causal). This model also, according to Berry, espouses a definition of the concept of culture as an adaptation tool for groups and individuals to use in their interactions with their environmental setting.

This approach, in general, is attempting to assert that ecology, culture, and behavior are in fact interrelated mutually, in such a way that any element can not be fully understood without viewing it in its contextual place with the other elements. Berry concluded that, while the human variation is real, in responding to their varying

ecological-cultural contexts, the characteristics of these variations can be observed if a multi-level (individual, group, and social level) of analysis is used (Ibid., 80: p404). Finally, he proposed that the implications of this knowledge about the individual and group cultural and behavioral variability should be in terms of "diversed goals" for development and planning. In other words, correcting the traditional assumption of planners, that generalized goals can be serving everyone in the society. That it is to suggest being careful when setting goals that may overlook diversed values of different cultural groups.

Three Ways to Define Culture

The above discussion has indicated that, within an ecological view of the behavior-physical environment relation, cultural variables are interrelated. It is, then, important to look at the different way by which the notion of culture can be defined. Rapoport has pointed out that,

> Anthropologists agree about the centrality of 'culture' in defining humanity. Beyond that, however, they disagree much more. Thus definitions of culture abound. (Rapoport, 80:p9).

He, then, suggested that all definitions of culture can be viewed in three general views. The first definition is that culture is a "way of life typical of a group". The second view defines it as "a system of symbols, meanings,

and cognitive schemata transmitted through symbolic codes". The third approach views culture as a set of adaptive strategies for survival related to ecology and resources.

These three definitions can be seen in a continuum that has these elements:

(1) culture as a way of life (manifestation)
(2) culture as system of symbols and meanings (manifestation/adaptation)
(3) culture as a set of adaptive strategies (adaptation)

Therefore, the two fundamental dimensions meanings of culture are: manifestation, and adaptation. In the same time if one views culture as a system of symbols, meanings, he will be looking at the means to achieve the dimension of manifestation and/or adaptation. In other words, these two dimensions (manifestation and adaptation) represent the purpose of culture. People express their life (manifestation), while coping with the environment (adaptation). It is, then, important to consider all these dimensions when viewing the behavior-environment relation in an ecological context.

Summation

This chapter, by dealing with the question of how the built-environment relates to people, has raised and developed the following notes:

(1) There are three major philosophical/theoretical attitudes toward man environment interactions. One is that

environment controls and determines human behavior; the second is that behavior determines and constructs the environment; and the third is that both environment and behavior interact mutually.

(2) The current view in the emerging behavior science is a human ecological one.

(3) The underlined assumption of this view is that no part of the human behavior-environment system is an independent entity and without multi-level analysis considering the eco-cultural-behavioral variables no advances could be made in our understanding of the human behavior-built-environment relations.

CHAPTER II

DESIGNING THE BUILT-ENVIRONMENT: A THEORETICAL REORIENTATION

The previous chapter has, already, demonstrated the various theoretical attitudes towards the relationship between human behavior and the built-environment, using a variety of disciplines. The considerable contribution to this relationship was shown to be made by researchers from the emerging behavior science field--that is a multi-discipline which includes researchers from mainly social science fields. This contribution has reoriented the traditional theoretical attitude of that the physical or the built-environment determines human behavior (environmental determinism), to a rather probabilistic view of this relationship. In other words, that there is a relationship between behavior and the physical environment but not merely determined by physical criteria. This current trend has also suggested the importance of the context of this relationship the thing that accounted for the ecological view in which cultural variables should also be considered.

On the other hand, the fields which are concerned by designing the built-environment such as architecture and city planning have done a little contribution to

the study of behavior-built-environment relation. The way most of our built-environment is designed, reflects the designers traditional environmental determinism attitude. Moreover,

> . . . the traditional focus of architectural theory has been on the relationship of the architect to the artifact he produces and thus on the ideologies and testements of individual designers, rather than on the relationship between people (either as individuals, or in general) and the built-environment. It has not focused on understanding how the environment is perceived, the meaning it has for different people in either concrete or symbolic terms, or the opportunities that different people perceive in it. (Lang et al., 74:p8).

Therefore, there is a need to reorient the whole architectural and urban design theory toward an assumption based on the understanding of the nature of the relationship between human behavior and the built-environment. In other words, in order to make sense of the whole study of behavior-built environment relation both researchers (behavior scientists) and designers (architects and planners) should cooperate by at least coming together under common basic assumptions and theories.

This chapter will focus on the architectural and design theory concerning the behavior-built environment issue, in order to find a way to reorient the environmental deterministic attitude toward a human ecological one. This attempt will commence by looking at the meaning of rationality in the design process. This will

be followed by a discussion of the architectural design fallacies and bias both at the theoretical and the professional level. Finally, an attempt to redefine architecture, using the suggestions of previous discussions, will conclude this chapter.

The Meaning of the Rational Design Process

The term rationality does not only apply to the design process, rather it represents, to a certain extent, the major thrust of our contemporary culture. However, this term has created a range of arguments which has resulted a general distrust of whatever is rational design.

> There is a growing belief that the worst excesses of the past few decades in both architecture and town planning have been due to 'too much rationality'. (Abel, 80:p293).

There is a fundamental link between the notion of "rationality" and the notion of "consciousness". The question is, then, consciousness or awareness of what? and how? In other words in order to call the design process "rational," one should question: Toward what this rationality, awareness, or consciousness is directed?

In a philosophical context, rationality has two basic aspects, one is based on a "logic sense" and the other on a "critical sense" (Abel, 80:p305). By discussing

these two aspects, Abel, in his paper, Meaning and Rationality in Design, has introduced the dimension of architecture as a means of communication compared to language. His question was; can the architect or the designer,

> . . . through taking the attitudes of others involved in the act of building, adjust his own behavior as a designer in the light of a critical awareness of the meaning his designs have for other persons? (Ibid., 80:p305).

Many others considered architecture as a non-verbal communication. However, Abel's analogy and view of architecture was more critical in analyzing what is verbal. He used a late experimental finding on the human brain, which concluded that the left half of the human brain is functioning to comprehend and deal with the language while the other half is only capable of dealing with "nouns." Moreover, the right half can handle "shapes and spatial relationships and visual patterns a little better" (80:p295). For this reason the left half is assumed to be superior or "major" and the right half of the brain remains minor--if we agree on regarding language as the highest achievement of human evolution. Abel, then, elaborated on the significance of nouns and verbs as distinct functions in understanding the language. Accordingly, he used Foerster's differentiation;

> . . . between cognitive process used to discriminate and identify forms and shapes as compared to those which are used to discriminate and identify change and movement. (Ibid., 80:p297).

The first process is identified by ascending hierarchical structure of nouns (Figure 5). The second process is a closed hierarchical structure defining verbs (Figure 6). The two processes together contain the definite semantic structures which represents the two fundamental kinds of phenomena,

> . . . namely definite nouns for things distinct in form and of shape, and verbs for change and motion. (80:pp297-298).

In order then to understand and analyze behavior (verbs), the element of time should be clearly represented.

Going back to the rational design process, which could only, in the most successful examples, analyze forms but never could relate them to behavior. In this case, the awareness is limited to the previously discussed, ultimate object of design. The traditional programming in planning and architecture used to ascend hierarchies of elements such as residential, recreation, etc. However, the closed hierarchial structure that explains the relationship between different elements of the design considering change and movement (behavior), is not a concern of the design process.

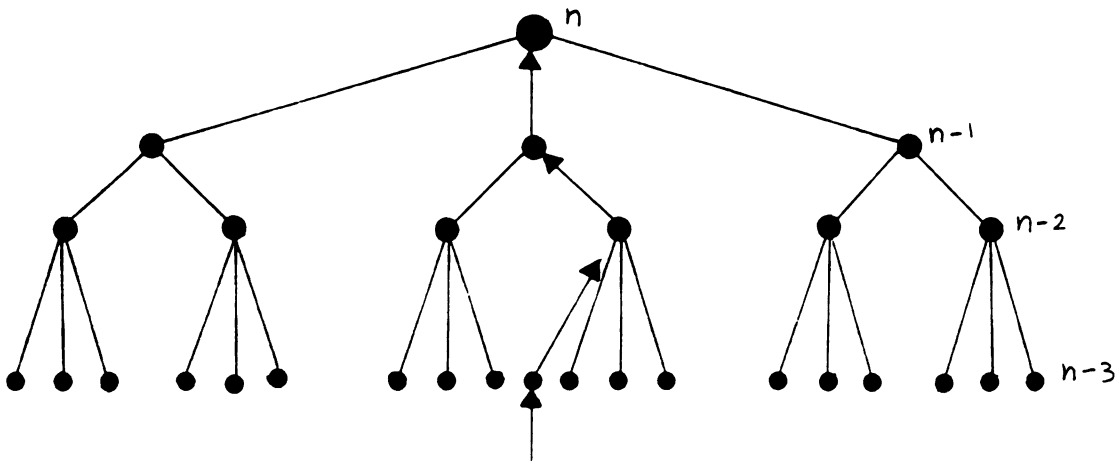

Figure 5.--Ascending Hierarchical Definition Structure for Nouns

SOURCE: Abel, 80:p297

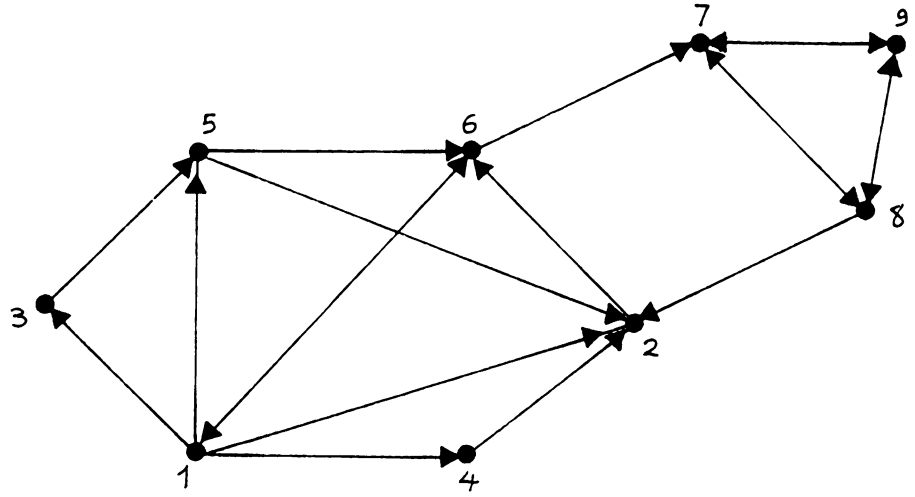

Figure 6.--Closed Hierarchical Definition Structure for Verbs

SOURCE: Abel, 80:p297

Awareness about behavior, is in fact, awareness about the other partner in the design (communication) process which are the users. According to Mead's criteria of rationality, this critical awareness is strongly equated with rationality, and hence, "the buildings of the modernists were, far from being the products of rational design, wholly irrational in intention and content" (Ibid., 80:p308). This critical awareness should be transformed into critical control if a designer takes the role of the others, he then becomes an object to himself, bringing his own social experience into consciousness. Only through this critical sense the design process can assume the critical aspect of rationality (mobilizing self in the process).

The other aspect of the term rational is one which is based on the premises of the logical sense. Classically, the term rational can apply to any process that is modeled on the method of reasoning of early Greek geometers. This method of reasoning assumes a set of given unquestioned and unquestionable propositions which are used as a starting point for an argument (80:p301). This argument then is deduced from the basic premises (propositions), similar to the pure mathematics deduction with the difference in sense which is that while the mathematics deals with abstracts the rational philosophy deals with

truth. The criticism, usually, confronting the rational philosopher is that he does not weigh his arguments "against any kind of empirical evidences" (Ibid., 80:p302). The Modern Movement in Architecture, similarly, rationally philosophized it's theories and product (form) as "logically deduced, of a natural unfolding of the historical process" (Ibid., 80:p302). Again the same argument and criticism could take place in a form of questioning these claimed theories which did not consider the existing built-environment as a base of investigation and empirical analysis. However, in the philosophical context, the architectural theory still holds the claim of being "accurately described as the product of rational argument." Therefore the claim that the contemporary design process is rational, can only be valid if we are considering architecture and design as a sub-discipline of philosophy--which, unfortunately, is not true. It is even more than just a discipline as it involves every aspect of our life and interferes in everyone's activity. It lies within the whole notion of physical manifestation of culture; a means to give meaning to space, and a strong communication pattern.

> The metaphor of architecture as a language is a powerful one and at the same time frought with difficulty. (Ibid., 80:p308).

Perhaps one of the great difficulties of architecture is its compatibility with the industrial revolution in general and with the 20th century very fast pace of

the modern technology. Because we are not sure, we want empirical evidences before making decisions in order to bring everything under control. While this techno-scientific development was taking place with the drastic economic way of thinking dominating, the whole field of architecture, both the academic and the professional, has tried to cope with change. As Le Crobusier wrote,

> A great epoch has begun.
> There exists a new spirit.
> There exists a mass of work conceived in the new spirit; it is to be met with particularly in industrial production.
> Architecture is stifled by custom.
> The 'styles' are a lie.
> Style is a unity of principle animating all the result of a state of mind which has its own special character.
> Our own epoch is determining, day by day, its own style.
> Our eyes, unhappily, are unable yet to discern it.
> (Le Crobusier, 27:p82).

The Architectural Design Bias

In the light of questioning the design "rationality" suggested in the last section, a closer look at the architectural dilemma is addressing itself, in this section.

The discussion will have two dimensions; one is the theoretical and the second is the professional stream of architecture. The differentiation between these two dimensions (theoretical and professional) is quite important, simply because what is in the theory is what goes into the minds of the architects and students,

and as a result the professional application extends the same rules and orientations--in the design itself. Another point is that the different limitations within each stream needs different attention and different treatment.

Cloris Heimsath (77) in his book, Behavioral Architecture, discussed six fallacies concerning architecture. While two of his fallacies are broad and can briefly be termed as the social fallacy of our contemporary urban system, four of these fallacies, on the other hand, could be called the design and planning fallacies and they can be quoted as follows:

(1) . . . essentially it is the fallacy of the architectural determinism which operates as if architecture directly determines behavior through design (with no influence from the social names directing behavior). (Heimsath, 77:pp36-37);
(2) . . . the 'Genius Fallacy' is more common outside the design profession than in it. As a part of America's art-myth syndrome, the American public is generally uncritical of an architect who clearly has shown ability considerably beyond the ordinary. (Ibid., 77:p40).
(3) Those espousing this Manipulation Fallacy point to the rigid regimentation of Fascist architecture or the endless repetition of housing blocks in the Soviet Union. (They overlook the equally rigid regimentation and endless repitition of housing in Queens, New York.). (Ibid., 77:p44). and;
(4) Finally the Know-Nothing Fallacy is held by pragmatic administrators who were once idealistic and have had their fond dreams shattered by frustration. The premise of this fallacy is simply that it is all too complicated! Yes, there is merit to the basic thesis, some would say, but it is hard enough to get a building in on budget now, much less waste time contemplating whether or not there should ever be a building. (Ibid., 77:p46).

These four fallacies are basically representing both the theoretical and professional limitations of architecture.

The Theoretical Limitations

The theoretical premises of any applied field of science are the assumptions made through the process of practicing and reexamining the theory itself. This can be basically done if the theory itself is oriented toward some testable or measurable criteria. The architectural theory, in general, assumed that the dependent variable is people's behavior and the independent is the building form. In other words the assumption that it is only the built-environment that determines behavior. This very fundamental assumption has never changed, simply, because it was never tested--at least by the architects. The roots of this theoretical attitude can be traced back to the philosophical development of architecture as "art" and the architect as "artist" and "genius." The genius fallacy, for example, has its roots in the "Romantic Theory" in which the genius does not conform to,

> . . . rules with more than average skill and efficiency but instead with the discovery of new rules and with effecting a breakthrough which would be accepted by subsequent generations of artists as the source of new avenues of exploration or modified rules. (Quantrill, 74:p20).

A genius, then, should be an original man as Quantrill, quoted Kant's famous statement: "Fine art is only possible as a product of genius; originality must be

its primary property" (Ibid., 74:p20). By the transformation of science and technology, in the beginning of the 20th Century, the conflict between this Romantic spirit and the academic tradition had taken place. The Academic tradition argues for the function, and its masters called themselves genius--as they innovated already this shift. In other words, they held the Romantic myth of being always genius with slight transformation in the purpose of architecture toward function. By doing this they did not introduce anything as to how can they test this function, therefore, they became rather contradictory to themselves. The evidence of this biased situation is the arising of different schools of architecture based primarily on a "genius" architect.

Another basic bias representing a theoretical limitation of architecture is the architects extraordinary reluctance to embrace the modern notion of humanity that considers the human values and applies scientific methodologies to the problems of mankind (Land et al., 74:p8). This attitude seems as if they do not realize that they are in the very heart of dealing with these problems.

Finally, above all, the cause of the architect's and designer's bias is the extremely deterministic view they hold, implicitly, with very little attention to any theoretical shifts in other, strongly linked, discipline such as anthropology, psychology, and the emerging behavioral science.

In the realm of architecture determinism, Heimsath (77:p35) collapsed the contemporary theoretical orientations into three main trends. First, is the traditional "Modern Movement," extended from the "First Machine Age" to what Banham (70) called the "Second Machine Age," as the "Modern Architecture." This movement, as founded by Le Corbusier in the early years of the 20th century, is based in the first place on aethetic premises. The second trend is what can be called the banal or the commercial architecture, that is what is shaping most of our cities particularly along the commercial strips. The third direction of architecture is marked by the utobian thinking and its tendency toward what Banham (76) called "Mega-structure."

The Modern Architecture, based on the aethetic primacy, is in fact the main body of the state-of-the-art of the architectural determinism. This orientation as well as others, is receiving the largest share of criticism and attack.

> To describe the attack of sociologists on the planning professions as warfare would be inaccurate since, at the moment, all the shooting is coming from one side. Designers and planners do not seem to be shooting back and it may be that they are not aware that they are under attack. If this is the case it is regrettable. Although some of these assults only demonstrate that behavioral scientists are as capable of being obtuse as anyone else, their main claim--that the planning professions have subordinated vital human values to somewhat arbitrary professional values--is well documented. The professions would serve the

> public better by giving these charges very careful consideration. (Deasy, 74:p8-9).

By even leaving out the area of aethetic theory and establishment, which is rather questionable, the criteria of being critically rational was not considered, and as a result,

> . . . happily, we can date the death of modern architecture to a precise moment in time. . . . Modern Architecture died in St. Louis, Missouri on July 15, 1972 at 3:32 p.m. (or thereabouts) when the infamous Pruit-Igoe scheme, or rather several of its slab blocks, were given the final 'coup de grâce' by dynamite. . . . Previously it had been vandalised, multilated and defaced by its black inhabitants, and although millions of dollars were pumped back, trying to keep it alive (fixing the broken elevators, reparing smashed windows, repainting), it was finally put out of its misery. (Jencks, 77:p9).

This was (Figure 7) an inevitable consequence of the determinist attitude which believed to change the people's behavior by, simply, changing the physical environment. The dramatical dimension of this accident is that "Pruitt-Igoe was constructed according to the most progressive ideals of CIAM (the Congress of International Modern Architects) and it won an award from the American Institute of Architects when it was designed in 1951" (Ibid., 77:p9).

The lay out of all the designed elements, in that scheme, did not succeed in determining a new, safer, environment. Fourteen stories high, separated pedestrian from vehicle traffic, "sun space and greenery," were not

Figure 7.--Pruitt-Igoe Housing Scheme Blown Up in 1972

SOURCE: After Jencks, 77:p9

enough to bring about a significant change in people's behavior.

Newman (72), in his book Defensible Space, attributed the unsafe environment of that scheme to; long, double or single loaded corridors, anonymity, and the lack of controlled "semi-private space." However, a major factor is that the design did not allow for any change or in other words there was a lack of adaptability in the design elements in such a way pertaining to the users behavioral patterns and needs.

The idea behind Pruitt-Igoe housing was to house a black community using the most of the "architectural determinism" that is "taken over from philosophic doctrines of Rationalism, Behaviorism and pragmatism--" (Jencks, 77:p10). The scheme's style, then (based on Le Corbusier's principles) and its clean "salbrious hospital metaphor," were meant to instill by good example, corresponding virtues in the inhabitants (Ibid., 77:p9). It did not work!

The second trend of architecture is what Heimsath (77:p35) called "the direction marked with preocupation with the banal." This is the case for places like Las Figas (as an extreme of this direction), where the visual signs, although important, represent a kind of artificial reality. This type of architecture in the shape of commercial supergraphics is now extending to

every city. Figure 19 shows how the misuse of this type of visual supergraphics adds more confusion to our urban life. On the other hand, it does not even fulfill its basic premise which is aesthetics. At any measure, this trend is completely leaving out the issue of design theory in question at best. It is growing and getting stronger to the extent that it occupies all the elevations or the facades of the American cities.

The third direction is a Utopian one.

> There has always been an architecture of utopia and it fulfills a particular niche in the theory by exploring alternative constrained only by the creative imagination. (Ibid., 77:p9).

This direction is seen in the early work of Goodman (47) "Communitas," the ideals of Soleri (69) "Archology," and in the imagination of Dantzig and Saaty (73) "Compact City." These attempts are, although taking different directions, representing an alternative solution to the problems of our cities. They all share a good intention and strong insight regarding the quality of life deteriorating by the excessive use of automobile and the isolation of individuals and groups within the urban setting. However, they all based their solution on the same deterministic approach. That is the new forms of huge, compact, and total environments they thought of, can easily determine the pattern of human behavior. This is to, great extent questionable, if not completely rejected

Figure 8.--Confusion and Ugliness, Long Island

SOURCE: After a Publication by the American Institute of Architects titled No Time For Ugliness, An Appraisal of the American City. (unknown date).

assumption according to the latest trends in behavioral science. An example of these imagined environments is Soleri's "archology hexahedron" (Figure 9) in which a population of 170,000 can live and be under a total control (Soleri, 69:pl15).

The first general argument that faces the utopian thinking is that they claim that the future is predictable, if so, what is the theory articulated in a testable fashion to make one asserts such claim. Jarvie (68), criticizing the utopians wrote,

> It is far too fanciful, too up-in-the air. Neither the feasibility nor the likelihood of the plans is known. But one thing surely is known: utopia will cost a lot, take a long time, and cause much social upheaval. (Jarvie, 68:pl5).

Another argument is that how do the utopians expect everyone to conform to their ideal, imposed, dreams? Moreover, the rigid organization of their schemes allows no room for innovation and change, and with little breakdown in energy supply the result will be a disaster.

On the other hand, in answering the question of whether Soleri is practical or crazy, Blake wrote in his forward to Soleri's book (69);

> In view of what has been happening on this planet in recent years, it is safe to say that those in charge are neither practical nor sane. This does not mean, of course, that any visionary profoundly critical of the present order of things is necessarily more practical or more sane. All it does mean is that anyone committed to the present way of building buildings, cities, or societies should disqualify himself as a critic of Soleri's proposal. (Blake, 69).

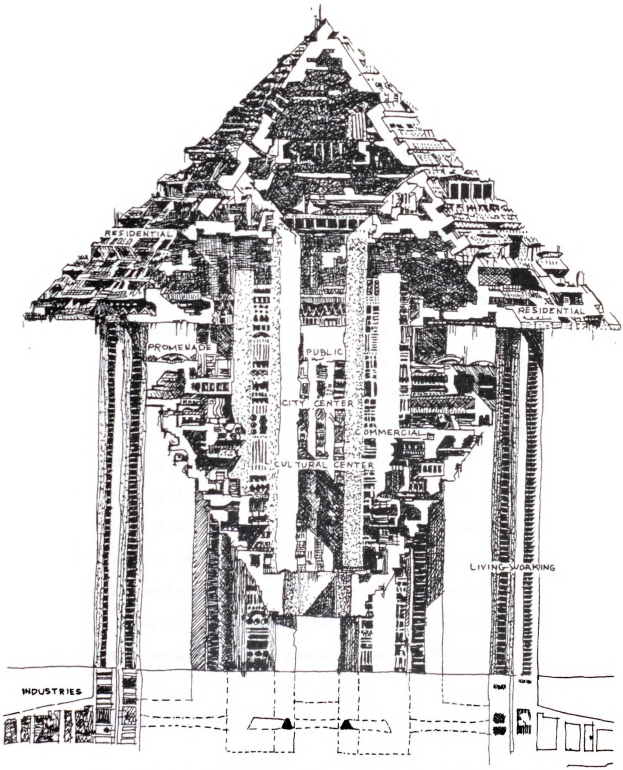

Figure 9.--Archology Hexahedron, A Scheme to House 170,000 Persons.

SOURCE: Soleri, 69:pl15.

Perhaps one partial realization of the utopians dreams is the "megastructures."

> This, of course, was exactly the line that Le Corbusier had taken forty-seven years before in introducing his 'Ville contemporaine pour trois millions d'habitants' in 1922, insisting that it was indeed a contemporary city that could be built at once, mistaking purely technical feasibility (though even that may be doubted) for political and fiscal possibility. (Banham, 76: p196).

In this extent the term megastructure goes back to the origin of both the "Modern Architecture" and the "modern town planning" itself. Therefore, Banham (76) analysis of megastructure indicated that it is not more than going back to the recent past in the shadow of the same deterministic assumption. The utopian architect and planner then share the same fallacies, bias, and limitations with any other non-utopian counterpart. The only thing the utopian architect is really doing is that he escapes from the professional dilemma and limitations. He goes by his imagination beyond the economic, political, and legal limitations imposed on the profession. In doing this, he does not even give the alternative to these limitations except in the realm of an "off-the-wall," "visonary," or "ideal" society. It could then be put this way: instead of facing our existing problems, utopians structure, an imaginary comprehensive scheme of more complex unknown problems. This leads the discussion to the reality of the architectural profession and its limitations.

The Professional Limitations

The professional limitations of architecture and design are to a large extent, similar to those of the planning in general. They stem from the indirect relationship between the architect and his real, although informal, client (the users). The architect is, like any other professional, bound traditionally, financially, emotionally, and legally to a client. However, in most cases, this client does not fully represent neither the users, nor their needs. Even if one assumes a good intention from the architect in viewing the behavioral patterns and trying to serve the needs of his "informal clients," he will be, then, committing a failure of serving the expressed needs of the formal client. If this happens he would probably starve to death (Deasy, 74:p12).

Robert Goodman (71), in his book After the Planners, layed out a strong, "bitter" vision of the professional dilemma of architecture and planning. Although his analysis blame in the first place the architects, it underlies even more their limitation within a political context. Whether the architect or the planner has good intention or not, he is often used to manipulate the resources and wealth for the benefit of a small segment of people. The nature of the planning and architecture professional is a very critical one. They often exist in the heart of the power structure and political decision

making. Unfortunately, these professionals are powerless, all they can do is translate in a physical term what their formal clients want. The client whether it is a public agency or private developer usually does not view the importance of knowing about behavior-environment research as much as he will be looking forward to achieve his own goals whether they are economic or political ones.

These limitations, added to the deterministic approach, make the architectural and design dilemma even greater. Goodman, quoted Minoru Yamasaki (the architect for the Pruitt-Igoe Public Housing Project in St. Louis), expressing these limitations in these words,

> As an architect, if I had no economic or social limitations, I'd solve all my problems with one-story buildings. Imagine how pleasant it would be to always work and plan in spaces overlooking lovely gardens filled with flowers.
>
> Yet, we know that within the framework of our present cities this is impossible to achieve. Why? Because we must recognize social and economic limitations and requirements. A solution without such recognition would be meaningless. (Yamasaki, as quoted by Goodman, 71:p92).

These words were said at the peak of the failure of his project that disproved his determinism, even with a one-story building.

Architecture as Cultural Adaptation

The term architecture embodies two notions. One is the process of design and the other is the product build-objects, spaces or environment. The whole notion of

architecture as a product is linked to culture. It is in fact a manifestation form of culture. Like the arts, architecture reflects certain qualities and characteristics of a specific culture.

Chapter I added another suggestion to the linkage between architecture and culture. This is that culture as it can be seen in terms of manifestation should also be viewed as adaptation--both complement each other as two dimensions of culture. As such, the notion of architecture as a cultural product (manifestation) and tool (adaptation) can serve as a basis for bringing another dimension to the theory of architecture. This will be the attempt shaping this section.

Redefining Architecture

One of the basic steps toward a new orientation in the theory of architecture (different from the determinism) is to define it in such a way, so that two crucial points should be considered. First, is that the design process should be explained in terms of clear articulations of the inter-relationships between the behavior and the built-environment, viewed in evolution. The second point is the importance of identifying the context of this relationship. The built-environment in other words should not be, in any case, defined as a static complex of forms

and space, rather it should be viewed as a dynamic relationship to human behavior and activities.

By using these two broad principles, one can achieve a generative device for, different, and new methods of design. This will be achieved by transforming the traditional descriptive principles of design into rather prescriptive or analytical ones through scientific interpretations.

In contrast to this proposed scientific framework for defining architecture, the typical definitions used to be abstract statements expressing philosophical outlooks which lack any practical implications. Some examples of these typical definitions are;

> Architecture, as a phase of art, is an expression in building of that idealism which is capable of translation into structural terms; that idealism which may be realized in an interpretation of the laws governing structure; an idealism which may find in terms of structural force a deep symbolism of its own true essence. (Pond, 18:p23).

> Architecture, sculpture and painting are, by definition, dependent on space, tied down to the necessity to come to terms with space, each by its own means . . . the key to aethetic emotion is a function of space. (Le Corbusier, 54:p33).

> The business of Architecture is to establish emotional relationships by means of raw materials. Architecture goes beyond utilitarian needs.
> Architecture is a plastic thing . . .
> Architecture is a thing of art, a phenomenon of the emotions, lying outside questions of construction and beyond them . . .
> Architecture is the masterly, correct and magnificient play of masses brought together in light . . . (Le Corbusier, 27:p10).

> Architecture is the will of an epoch translated into space. (Mis Van der Rohe, as quoted by Banham, 60:p272).

All these statements and more about architecture are not expressing wrong ideas, but they can by no means help the purpose of usefully defining architecture. Although they bear particular aspects and attributes of architecture, such as space, light, emotions, they are too broad to be useful. They do not express any relationship between these broad aspects and attributes, and people. Moreover, they distinguish between architecture and construction by referring to architecture as a "thing of art." Above all, they express, by being broad, a sense of uncertainty and fear resulting from being confronted to the technological advancements of our age without enough scientific tools to cope with it. This was best admitted by these words;

> If a single word was needed to sum up the mood of the last fifty years, that word, in my opinion, would be 'uncertainty'. There is not a single system of values which has not been undermined, and this is particularly obvious in the sphere of aesthetics. The proponents of the great revolution in architecture known as the 'modern movement' positively denigrated aethetic value, claiming it was inconsistent with the requirements of the machine age. (Smith, 79:pvii).

This uncertainty, unfortunately, is not a scientific one, if so, the problem would have been limited to revising the finding and choosing the alternatives based on the strongest evidence. It is merely philosophical.

Until very recently, the statements of architectural philosophy has been centered around the concept of form and its relation to function and structure. It was a question of what comes first?; but what kind of variables or attributes these three concepts have in relation to the human behavior? This philosophical confusion created by great Masters can be summarized as,

- Form follows function (Sullivan)
- Function follows form (Soleri)
- Form/function is one (Wright)
- Form follows desire (Kahn)
- Form is a process (McHarg). (Banham, 60).

This philosophical exercise, as it seems, is fully understood and expected from the Modern Movement and its consequences, since "form" was inherited from the 19th century notion of morphology (biology and geology). Although, and perhaps due to the death of the Modern Architecture (Jencks, 77:p9), the post-modern architects and planners in general rarely talk about form, function and structure, they implicitly keep them in mind as their central theme. The new language of these contemporary architects is, rather, looking at "architecture as a language," "architecture as energy," or "architecture as geometry."

In general cultural context, architecture used to be viewed as a style of life or as a manifestation of culture. In order to balance this view is to consider architecture as an adaptive tool or in other words, as

adaptation. If we consider that the architects and urban designers assertion that the built-environment is determining the pattern of behavior, that means that the people will have to adapt themselves to this built-environment. This notion of adaptation is a dynamic process that involves time. There is no doubt in many cases, some groups of people fail to adapt to a certain designed environment, and in other cases they do to a certain extent. The point, here, is that why should only people adapt and not this physical environment, or why should it be only one way adaptation? The root of this question is the question of what is the goal of the city.

> The definition given by Aristotle, who said that the goal of the city is to make Man (Anthropos), the citizen, happy and safe. (Doxiadis, 74:p211).

This is a basic definition of the goal of the city, although criticized by being narrow. Most people agree about some definition of the term "safe" but they do not agree about those of the term "happy." The problem is that the term happy has more association with the variabilities among different individuals. While the term "safe" can be understood by eliminating the unsafe situations that may lead to loss of money, property, or life--things we can measure. The term happy, unfortunately can not be measured by these reverse attributes. However, a general description of it may be "the state of balance

between ones inner system and the immediate spatial and temporal variation of the environmental interactions preceived by him." The key point in this view is this balance between man and his environment as the most important characteristic of happiness.

As many did, Doxiadis realized that "Aristotle was also probably not concerned about the notion of where we go from here?" (Ibid., 74:p211). In other words, being happy and safe is not quite enough as goals if we consider the future. In this extent he added "that the goal of the city is to make Man (Anthropos) happy and safe and also to help his human development." He then, based on this definition, introduced his fundamental eighteen hypotheses. The central theme of his hypothesis was that the five environmental elements (Nature, Man [Anthropos], Society, Sells, Networks), are guided by five principles as follows:

(1) Maximization of Man's potential contact,
(2) Minimization of energy. Not only man, actually, a donkey going uphill, tries to discover the best possible path for minimization of energy.
(3) Optimization of protective space. When we talk together, when we sleep in bed with the other sex, when we move away from something that annoys us; each time we seek an optimum dimension.
(4) Balancing the five contextual elements (Nature, Man, Society, Shells, Networks).
(5) Optimumizing the synthesis of the previous four principles - based on time and space, on actual condition, and on man ability to create his own synthesis. (Ibid., 74:pp212-213).

These five principles can be very useful for the purpose of supporting the proposed view of architecture as a cultural tool of adaptation. They are articulated in a very analytical manner. They also touch on one underlying theme of this thesis which is the interplay between the constant and the variable elements of the built-environment. The constant elements are assumed traditionally, by the architects and planners as to be the buildings while they are content to claim that the variable elements are people's behavior. Therefore they generalize these behaviors and assume that they can, by particular designs, control, predict, and change these behaviors. This view is no longer valid, and there is a need to a different attitude, one that considers that the built-environment is also a variable that interact with people's behavior in an ecological context. Thus, a safe way to carefully design such environment is by considering the notion of adaptation of both people's behavior and this built-environment.

The task, hence, in order to arrive to such attitude of an ecological human nature, is to define architecture in such a way that make distinction between two fundamental variables: the purposive or the objective variables, and the contextual or the ecological variables. Doxiadis's above principles number one, two and three are describing these purposive or objective variables, which can be summarized as efficiency and freedom of human

activities. On the other hand, principles four and five are referring to the contextual variables and their key criteria which is balance.

Moreover, a total equilibrium is achieved when these two variables (objective and ecological) are well synthesized.

In the light of such variables, architecture and design, thus, can be defined as: the art-science of design-constructing adaptive spaces and structures that maximize the efficiency and freedom of human activities in a human ecological context that is defined by the particular environment, in terms of social, technological, and political and economical organization of that environment and its linkage to other local, regional, state, national or international levels of interactions.

This definition allows to avoid the philosophical conflict arising when defining beauty or aethetics. Architecture is aethetically sound when simple balance of the human activities is achieved in their ecological context. The fitness will be of man's evolutionary purpose into man's ecological context. This can be measured by the two variables: freedom and efficiency of human activities, as of their evolutionary nature that governs the process of adaptation biologically, culturally, and psychologically, also over time.

The view of architecture as adaptive tools is similar to that of culture as adaptation since architecture itself, as building and structure, is one component of culture. This does not contradict the traditional view of architecture as a manifestation of values and way of life, rather, both views complement each other. In other words while a building is expressing and reflecting a particular style of life (culture as manifestation), it also works as adaptive tool for the users to cope with their environment (culture as adaptation). This definition approaches also the notion of rationality (as discussed early in this chapter), in that the designer of the built-environment (whether he is an architect, or urban designer) will base his work on a definition by which he seeks the awareness of the users needs and position (purposive position, and contextual position). By using this definition the designer of the built-environment will be contributing to the study of the relationship between behavior and the physical environment. This contribution will, at one hand, be by considering the importance of using behavioral attributes in the design, which, on the other hand will open an avenue of communication between designers and researchers dealing with behavior-physical environment relation. This will provide, then a possibilities to close a theoretical gap between designers and researchers. The next chapter will attempt to discuss these possibilities.

Summation

This chapter, by laying out a scheme for reconsidering the architectural and design theory, has provided the following conclusions:

(1) A "rational design process" is the one that considers the human behavior and values as basis for its criteria. Its goal should be the fitness of man and his needs into the context of the designed form, and its means are scientific or critical (analytical) methods of understanding both the human behavior and its context.

(2) In order for this process to operate, a theoretical reorientation of the architectural determinist theory is needed.

(3) This orientation, therefore, can start by redefining architecture in terms of cultural adaptation.

(4) By doing this, a common ground between the designers in the architecture and planning fields, and the researchers in the social and behavior science fields (particularly those who are working on the behavior/environment study), can be found.

Chapter III will concentrate on a synthesis between architecture and urban design viewed in cultural adaptation perspective and some general and specific concepts of behavioral science. The aim of this synthesis is to discuss the possibility for a human ecological theory of architecture and urban design.

CHAPTER III

TOWARD A THEORY OF HUMAN ECOLOGICAL ARCHITECTURE AND URBAN DESIGN

The architecture and the urban design theory, as pointed out earlier, is in need of a philosophical reorientation, toward considering human behavior and the physical environment, relation. It was suggested in the last chapter to redefine architecture as a cultural function--primary as adaptation. Two purposive or objective variables were generated from this definition, freedom and efficiency of human activities. In this chapter a conceptual synthesis addresses itself as a means to bridge the theoretical gap between the fields of environmental design such as architecture and urban design and the emerging behavioral science fields. This conceptual synthesis will be at two different levels. First is the general theoretical level, in other words the view and assumptions that consider the behavior built-environment relations, as a whole. The second level is a specific conceptual one in which different specific concepts and aspects of behavior will be used. The variables freedom and efficiency of human activities, based on defining architecture as cultural adaptation will be used in the synthesis of both, the theoretical and conceptual levels.

Finally, a discussion of theories and model will be presented as to be a base of constructing two models one is a conceptual model and the second is a design model. The purpose of these models is to lay out possibilities of application of the previous ideas.

General Theoretical Reorientation

In order for the suggested philosophical reorientation of the architecture and urban design theory to be achieved, concerning the relationship between behavior and the built-environment, the definition of architecture as adaptation should be synthesized in the emerging theory of behavior science--that is the ecological/cultural approach discussed in Chapter I.

The concept of architecture as adaptation is, to a great extent, function oriented since, "adaptability is a functional necessity" (Allsopp, 74:p86). The very overlooked, by architect, aspect of function is the dynamics and variability of human behavior. This is due to the unchanging deterministic approach, which assumes that the physical aspects of function only determine behavior. Within this deterministic approach, function is used to be presumed and the question becomes whether it comes before, after, or between form/structure. Unlike such, function as it is linked to adaptability, will be the question of how function/form/structure as a whole are

adaptable and useful to both the human needs and behavior. In other words, instead of seeking the internal organization of the parts of the built-environment into a built, coherent, whole, the view should extend to encompass the whole context, including people, into the design process. Such a process is similar to what Russell Ackoff called "humanization" and "environmentalization" (Ackoff, 74).

> Architecture is not for architects; it is for people, and whatever architects may think and whatever theories they may have, it is through the senses that people appreciate, that people feel architecture. (Allsopp, 74:p3).

Moreover, architecture is not abstract forms and spaces isolated from behavior. The objective, and purpose of the design process should be to maximize the efficiency and freedom of the human activities. These two fundamental variables bear, by nature, both the cultural and biological variability of the human evolutionary interactions with his environment. For this reason they are, hence, fitting in Berry's ecological-cultural-behavioral model and concept (discussed in Chapter I). These two variables are, indeed, existing in all levels of human behaviors and activities (individual, group, community, etc.).

J. Douglas Porteous commenced his book, Environment and Behavior, by a synthesis between environment, behavior, and planning (77:ppl3-14). He proposed a diagram that links these elements, which should be taken as a general

conceptual framework, see Figure 10. This framework of concepts calls for considering that,

> the city was built for man, and not man for the city. Before we change the world we should first understand it. The study of human behavior in the urban environment may thus be of value for both the design of new urban environments and for the 'better' management of the old . . . To achieve this we may need more, or less, or better planning, but it is clear that such ends will never be realized unless we design with people (Porteous, 1971), and plan with man in mind (Perin, 1970).

His framework suggests an important point, is that planning and design themselves are representing an important feature of behavior that lead to change the environment. In the same time there are two way interactions between behavior and the environment, one in terms of environmental stimulus (to behavior) and the second is in terms of behavioral response (to the environment). Therefore, these two interactions should be viewed whenever designing (changing) the environment (although his framework refers to the environment in general,it, also, applies to the built-environment).

While one's spatial behavior is seeking orientation, it is, also, enjoying or suffering, thus, experiencing the route. In other words, the human behavior is guided by a process of seeking goal and experiencing means. This process operates, generally by one concept known as "perception." It was suggested in Chapter I, that there are three different meanings of perception. In brief,

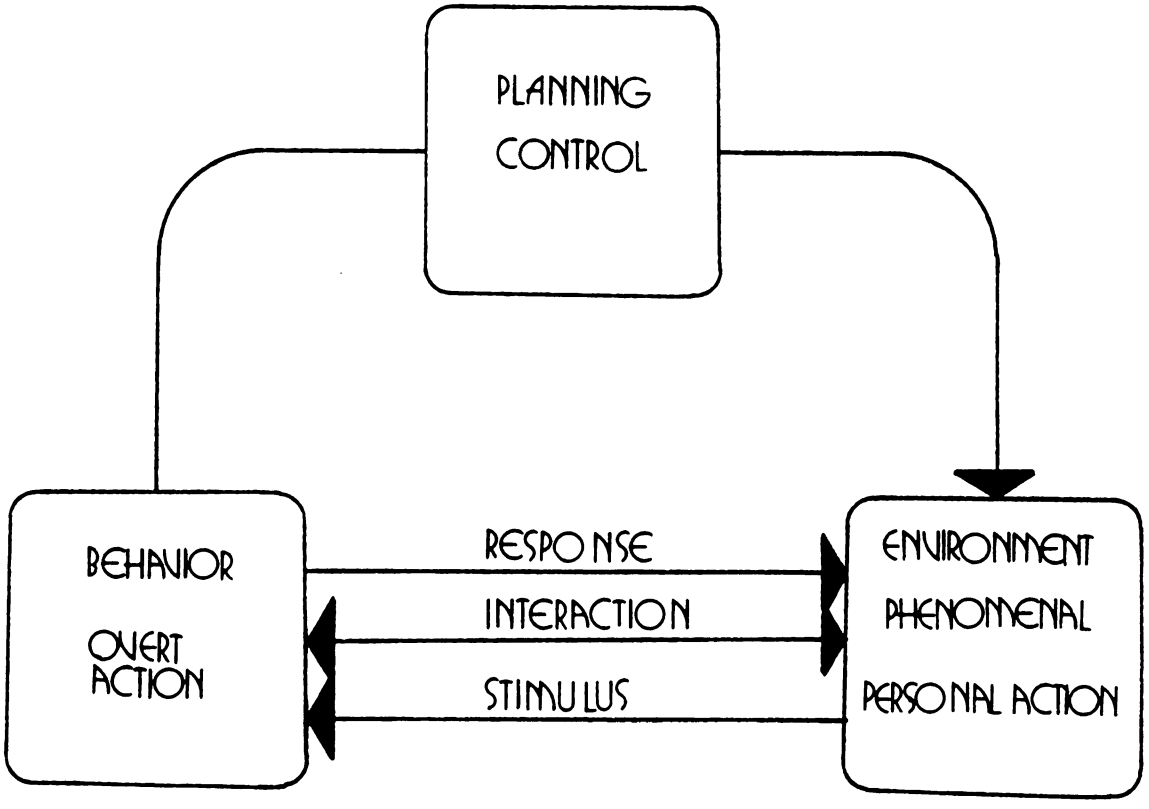

Figure 10.--Environment and Behavior

SOURCE: Porteous, 77:p15

they are environmental perception, environmental cognition, and environmental evaluation.

Environmental cognition, as was shown in Rapoport's continuum (the perception continuum, Figure 2), is in the center of this continuum as it relates to how people organize the environment, know it, and comprehend it, thus giving it a meaning. Cognition then is a goal seeking tool that guides the human behavior. Since, goal achievement, in a general sense, is linked to efficiency, hence, cognition as a concept follows this linkage to efficiency. How well people can comprehend their environment then will be reflected in how efficient their activities and behavior are.

Perception and evaluation on the other hand, are related to freedom in two different ways. Environmental perception, as defined earlier, is the way in which information about the environment is gathered and interpreted. In other words, it is through this process, of perceiving the environment, that the environment is experienced. While cognition is to clarify the environment, the perceptual experience on the other hand, through the senses, is one of richness and complexity (Ibid., 77:p207). Freedom of the human activity is related to the more possibilities to explore and experience. In this respect, environmental perception can be, with many of its qualities, linked to the freedom of the situation-contingent

(experience) aspect of the human behavior. Freedom of choice and selection, can, then, be connected to the notion of evaluation.

The synthesis illustrated in Figure 11 shows how the two purposive variables of freedom and efficiency are related to the three meanings of perception as they exist on a continuum. This was done by using the concept of continuum, as used by Rapoport (77:p31) to illustrate the three different meanings of perception. Two other continuums can be paralleled to the perception one. First is the nature of human behavior with its two meanings, goal and means; and second is the purpose of the human activities with its two variables, efficiency and freedom. The figure, then, shows that environmental cognition relates more to the goal of behavior as they both relate more to efficiency. On the other hand, both environmental perception and evaluation relate more to the means of behavior as they all relate more to freedom of the human activities. In other words the parallel concepts relate more vertically.

Again, the important theme of this view is the variability of human behavior, both culturally and biologically. This variability is not determined by the physical or the social environment. Therefore it should be noted that the probabilistic view of these

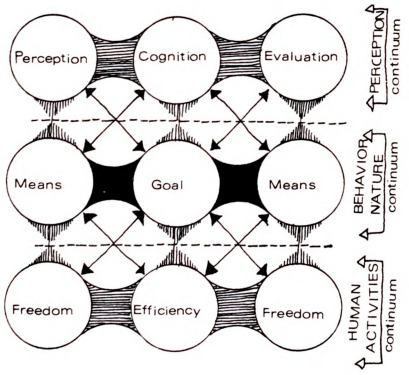

Figure 11.--Behavior/Perception Continuums

SOURCE: Adapted from Rapoport, 77:p31

variabilities, and mutual interaction between behavior and the environment, particularly the built-environment, is the one that should be supported in the architectural and urban design theory. The built-environment, in this view, is interacting with human behavior in terms of not to determine or generate activities, rather in terms of a setting of human activities (Ibid., 77:p2). In other words, it works as a "catalyst" that is "releasing latent behavior," and facilitator, by providing possibilities for choices, but that some choices are more than others in given physical settings.

> Human behavior in relation to physical setting reveals diversity over space at any given moment and continuous variability in any given space over time. (Proshansky et al., 70:p27).

In response to this variability, the concept of open-ended design, process and product addresses itself to the central principle of the architectural theory. The notion of open-ended design is a principle for allowing two fundamental aspects. These are flexibility, and diversity. Flexibility of the design will cope with the desired efficiency both of human activity and of the whole physical setting. On the other hand, diversity as a desired aspect of the design is by nature a perceptual quality, and is called by Rapoport (77) "Environmental Complexity," in essence a freedom of choice. Of course,

there is an optimum level of this diversity or complexity (see Rapoport, 77:Chapter II). The important point about this concept of complexity is that it is not an ultimate static aspect, rather it is dynamic and changing over time, so that the criteria for a desired optimum level of complexity in the design of a physical setting will be multidimensional. The thing that fits to the very nature of the open-ended concept of the design process.

Another quite important point to add is that the design process by being open-ended will not terminate at the implementation of the project, rather will be starting its continual stages of adjustment and design. This also should be done so that the users can do these adjustments as to fit to their changing behavioral patterns. By doing this, the design process will be achieving its ultimate goal of providing the possibilities for maximum efficiency and freedom of human activities. The basic guidelines for this design process will be the contextual indicators. These are the social, economic, climate, and political considerations.

Finally, in the light of this suggestion, a bridge can be built between the design and planning disciplines and the whole range of disciplines integrating in the emerging behavior science. The following section,

therefore, will try to discuss possibilities of some, more specific concepts contributed by the current views of the behavior science.

Specific Conceptual Reorientation

The last section was dealing with an attempt to synthesize, conceptually, the definition of architecture as adaptation with some behavioral aspects at the general theoretical level. This section, however, will focus on some specific concepts. The different meanings of perception, as it is the central concept of the current trend (information based theories) of environmental psychology and behavioral science in general, were discussed. These are as Rapoport classifies them; environmental cognition, environmental perception, and environmental evaluation. These are involved in almost any process of interaction between man and his environment, with different degrees. A good example of these processes that include all types of meanings of perception is the concept of image.

Environmental Image

To Boulding (56:pp5-6), the concept of image is this subjective knowledge, which one believes to be true. It is also this image which "largely governs my behavior" (56:p6). The image of man is this knowledge that has always something, even for the most intelligent person,

"beyond what words can utter" (56:p47). It is important to base our discussion, in this subsection, on Boulding's ten basic classifications of image.

> We have first the spatial image, the picture of the individual's location in the space around him. We have next the temporal image, his picture of the stream of time and his place in it. Third, we have the relational image, the picture of the universe around him as a system of regularities. Perhaps as a part of this we have, fourth the personal image, the picture of the individual in the midst of the universe of persons, roles, and organizations around him. Fifth, we have the value image which consists of the ordering on the scale of better or worse of the various parts of the whole image. Sixth, we have the affectional image, or emotional image, by which various items in the rest of the image are imbued with feeling or affect. Seventh, we have the division of the image into conscious, unconscious, and subconscious areas. Eighth, we have a dimension of certainty or uncertainty, clarity or vagueness. Ninth, we have a dimension of reality or unreality, that is, an image of the correspondence of the image itself with some 'outside' reality. Tenth, closely related to this but not identical with it, we have a public, private scale according to whether the image is shared by others or is peculiar to the individual. (56:pp47-48).

From these classifications, Rapoport asserts that the concept of image is one that is consisting of the three meanings of perception (cognition, perception, and evaluation). "Images can be understood as involving mainly affective and symbolic aspects" (Rapoport, 76:p227). The spatial, temporal, relational and personal images can be grouped as factual knowledge images (or cognition). On the other hand, affectional and value images can be called value images (perception/evaluation) (Rapoport, 77:p44). The rest of types of images are, in fact, different

dimensions that help to identify any of the former type, or group. For example, the dimension of subconscious and unconscious are related to value more than the conscious one, which relates to the factual knowledge image. They both, however, influence the strength by which images are held (77:p44).

To Lynch, in his classic contribution to both urban design and behavioral science, his book The Image of the City, the concept of image is a crucial one. He defined environmental image as "the generalized mental picture of the exterior physical world that is held by an individual," and these environmental images

> are the result of a two-way process between the observer and his environment. The environment suggests distinctions and relations, and the observer--with great adaptability and in the light of his own purposes--selects, organizes, and endows with meaning what he sees. The image so developed now limits and emphasizes what is seen, while the image itself is being tested against the filtered perceptual input in a constant interacting process. Thus the image of a given reality may vary significantly between different observers. (Lynch, 68:p46).

This process of constructing the environmental image is also "the product of both immediate sensation and of the memory of past experience, and is used to interpret information and guide action" (Ibid., 60:p4). Lynch, then, analyzed image into three components: identity, structure, and meaning. Identy is also related to Rapoport's notion of "noticeable difference" (Rapoport, 77) as the quality by which the object is identified. Structure is the order

and the spatial pattern of the object to other objects and to the observer. And finally, this object must have a meaning for the observer. Accordingly, since the focus is on the image of the built-environment as the independent variable, the most crucial qualities and conditions of this variable are "vividness" and "coherence"--if the objective is the enjoyment of the city.

Image then, by its different types and dimensions, is a very useful concept for urban design, especially through the concept of architecture as adaptation. Imaging is a dynamic process, naturally evolved, that is both adaptive and creative. It is the process by which we see, perceive, know, and evaluate the environment. As one, consciously or not, relate this whole environment to his own existance, he actually grasps the environment to his very consciousness. He adapts himself accordingly, and pays also a part of his life (psychological and physiological) in doing that. In this respect man can efficiently organize his world through optimum, "coherent," and "vivid" images (Lynch, 60:p118). By doing this he will be freeing his physiological and psychological efforts from being overloaded. On the other hand, people image the environment differently and what can be "coherent," and vivid images for one may not be for another. Therefore, the built-environment itself does not mean anything unless it is imaged by people (determined), differently.

Mental Mapping, Orientation and Meaning

To Rapoport "mental maps" are the subjective spacial representations by people of the environment (Rapoport, 76:p227). Mental mapping is, hence, a fundamental cognitive "process by which spatial information is acquired, coded, stored, decoded, and applied to the comprehension of the everyday physical environment" (Stea, 74:p150). The mental map is, in other words, an internal model of a portion of the environment, which "can play a centeral role in the interpretation of real environments and thus in the resulting behavior" (Kaplan, 76:p33). Although "we cannot observe a mental map," however, "if a subject behaves as if such a map existed, it is sufficient justification for the model" (Stea, 69: p14).

Thus, mental and cognitive maps are tools that enable man to cope with his environment. They vary between people and between cultural groups (Rapoport, 76), as they depend in their initial construction, on specific psychological and biological factors, beside prior experience (culture) of specific individual (moore, 76: p141). In this extent, mental maps are used as adaptive tool, therefore, they are linked to the functional aspects of adaptation; freedom and efficiency. As they help individuals "comprehend and use the environment" (Rapoport,

77:p120), hence, they help increasing their behavioral efficiency in terms of the use of physiological, and psychological energy. In the same time, with more comprehension of the environment, one can acquire certain degree of control, which in turn, is a sort of freedom of activity.

Environmental knowing or cognition is, in general, also relating to the notion of order and orientation. People seek not only to understand their environment but also to orient themselves through an "order" gained by or elicited from this comprehension. These two aspects or requirements of comprehending the environment are some tools to "economize" behavior. The need for order and orientation, hence, is a need for efficiency of human energy. As this process also involves the prior experience and culture, one can assert that this process is the central process of all our activities.

Meaning is an underlying purpose of the process of mental maps and images (cognition and perception). "The object of perception is meaning. Whenever we say we recognize an object, we are actually grasping a meaning" (Moore, 76:p143). Whether this happens by "grasping" a meaning or "giving" a meaning to the object, it is clear that meaning is the result of the relationship between man and his environment. Life is a meaningful event. Whether one "elicits" or "assigns" meaning from or to things or

events, he actually is placing them in his mental, cognitive, and perceptual process. Without doing that, these processes themselves will lose their purpose, thus their meaning. The meaning of architecture, therefore, is then elicited or assigned through the same process.

Our central problem of the modern architecture, as pointed out earlier, is that designers are dealing with a sort of formal aethetic criteria that is beyond any "eliciteable" or "assignable" meaning. From them became an abstract entity split from meaning, as a result,

> beauty is lost . . . This results, on one hand, in playing with formal relationships or pure 'composition,' which carries no message or contradicts meaning. On the other hand, it leads to the misnamed 'literary' approach, which limits meaning to what the observer knows about the subject matter and therefore offers chaotic, visually incomprehensible form. The tragic consequence of this split in our time has been that so many people have become blind to the meaning of form and that they believe they 'see' when they absorb meaning without form. (Arnheim, 71:p206).

Therefore, meaning as a process of environmental knowing should be a central criteria for aethetics. In this view, Rapoport (77) suggested a balance between two criteria; clarity and complexity, of this meaning; because clarity deals directly with understanding (symbolic aethetics), while complexity deals more with experiencing and enjoying (formal aethetics). Aethetics then will be resulting both symbolically and formally.

Spatial Behavior

Spatial behavior has several concepts in the literature. These can be grouped as: privacy, personal space, crowding, territoriality, and the emerging notion of defensible space. In general, all these concepts relate strongly to the notion of adaptation as they represent and relate to Kaplan's "Coping Strategies: choice and control" (Kaplan and Kaplan, 78:p263), and Holahan's "Environmental Coping" (Holahan, 78:p191).

> The ways in which people learn to cope with the depersonalizing and socially isolating character of so many of the environmental setting . . . are familiar features of modern life. While this type of coping is more subtle than dealing with the physical demands of the environment, it represents a fundamental aspect of the environmental coping process because too often even the best of contemporary design is out of step with human needs at the level of social and psychological functioning. (Holahan, 78:p191).

The underlying adaptive notions of all these coping strategies are freedom of choice, and the strive for control "sometimes of the environment, sometimes of the behavior of others, and sometimes of the flow of information" (Kaplan and Kaplan, 78:p265). Achieving control, in general, is related also to efficiency.

Privacy is a domain where one can do what one wishes, free from the influence of others. The basic example of privacy is the visual one, where it is a freedom from visual intrusion. Privacy is also an

inherited need for human evolution and growth. It allows one to communicate with himself at a deeper and more intensive level. It is also, by having it, a freedom of choice. Privacy is one of the basic human coping strategies used in man-environment interaction. Losing privacy will mean losing a fundamental freedom of choice. Schwartz made a point that privacy has important positive functions in personality development and that the chance to withdraw from the group also makes the individual more effective when he returns to active participation in group life (Schwartz, 72:p155). Privacy as a freedom of choice, conflicts, however, sometimes with bearing social responsibility at a larger level. This is like the case of army or any large institution. In this case a great deal of privacy is sacrificed for the efficiency of the whole. The trade-off becomes between the individual freedom of choice (which may relate to individual efficiency) and the institution goals and strategies. In any case, privacy is strongly related to the notion of adaptation and coping, especially to freedom and efficiency.

Personal space is "the emotionally charged zone around each person, . . . which helps to regulate the spacing of individuals," and it is also "the processes by which people mark out and personalize the spaces they inhabit" (Sommer, 69:pviii). It is "a small protective

sphere or bubble that an organism maintains between itself and others" (Hall, 66:p112). The term "protective sphere," indicate the adaptative aspect of this tool or strategy. Personal space or distance vary from one person to another and from culture to culture. It depends, to a large extent, on all the behavioral and cultural in addition to the psychological and biological characteristics of a person's environment. As an adaptive tool, it is used to define the boundaries of contact with different people. Within the defined personal space, one may acquire freedom of body movement, of emotional stress, and of choice. In other words, it is a subcategory of privacy--in this case it can be called "public privacy." By acquiring this freedom within a "personal space" one is expected to operate <u>efficiently</u>. However, in many cases this freedom is lost for the sake of other kinds of efficiency, like transportation (in rush hour trains).

<u>Crowding</u> is not only defined in this above obvious case, it also

> arises from a breakdown in self-other boundary regulation. Crowding effects are predicted to arise whenever the individual's 'desired level of privacy' is greater than the achieved level. This presumably occurs when privacy regulation mechanisms such as territories, non verbal gestures, etc., fail to provide the desired level of social interaction. When this occurs, no matter how ample the space or few the stimuli in absolute terms, the 'person' or 'group' will experience crowding. (Baron and Rodin, 78:p183).

In this view privacy and personal space, in terms of attaining freedom and control, are central goals in regarding the crowding effects (this model is called by Baron and Rodin, "Altman's Privacy Model"). Crowding prime effect, then, is the loss of freedom and privacy. It is a relative term that involves a perceptual quality that differs from one person to another. In one context, crowding is viewed as stressful, and loss of freedom, while on the other hand, can be viewed as a way to get more interactions (theaters, sport stadiums, etc.), or to get economic allocation of resources (public housing). Again, the concept of crowding viewed from these different points, reveals the diversity and conflict between freedom and control (efficiency) interchanging at the individual, group, and social levels of concern. Regarding the physical environment, a balance should be achieved between these diverse goals, by considering the individual freedom and efficiency to be achieved in an optimum crowded situation that allow also for a control of resources and social mobility--at all levels.

Territoriality is another form of social privacy. It is an evolved regulating-adaptive-mechanism and "to many it represents the reaching of maturity and the achievement of success and potency" (Newman, 72:p51).

> Territory is the space which a person as an individual, or as a member of a close knit group (e.g., family, gang), in joint tenancy, claims as his or their own, and will 'defend'. (Parr, 70:p12).

Like personal space is, territory within it freedom is seeked and it is, itself, a control of an individual or group over a certain property (their property).

Territoriality also relate to the social and cultural differentiation between different individuals and groups. It reflects one's social status or hierarchy. Its importance as a basic need at the individual level is a matter of argument. The reality of most of the world is the economic decline and lack of resources, above all is crowding. For this reason, the question becomes of the hierarchy of needs particularly at the contextual levels (economical, political, and social). As was quoted from Newman, that many see territoriality as success, one may argue that to many others (the poor majority all over the world) its picture is different. Their primary need is food and then shelter that is considered territory at only the collective level of ownership.

The only territoriality they really experience is the national one, particularly when they have to defend it by their lives. It is important,this feeling of belonging, but when it comes to be a basic individual need the question will be: What comes first? Territoriality, nevertheless, is connected to economy (efficiency) and freedom.

Defensible space is Newman's contribution and represents a step toward an architectural awareness of the area of spatial behavior. He defined "defensible space" as

> a model for residential environment which inhabits crime by creating the physical expression of a social fabric that defends itself . . . a surrogate term for the range of mechanisms--real and symbolic barriers, strongly defined areas of influence, and improved opportunities for surveillance--that combine to bring an environment under the control of its residents. (Newman, 72:p3).

He based his idea on four basic physical design elements.

> (1) The territorial definition of space in developments reflecting the areas of influence of the inhabitants.
>
> (2) Placing the apartment windows so that residents can survey the exterior and interior public areas from their living environment.
>
> (3) The adoption of building forms and idioms which reduces perceiving the vulnerability and isolation of the inhabitants.
>
> (4) Locating residential developments in functionally sympathetic urban areas immediately adjacent to activities that do not provide continued threat. (Ibid., 73:p9).

His studies found that the lack of territorial articulation not only decreases the use of outdoor space but also reduces social interaction among residents. The thing that results inefficient use of resources, disintegration of community, increase in crime rates, and loss of valuable physical structures. For this reason his proposed "defensible space" concept seeked to balance individual freedom and privacy with the sense and economy of the

community. Newman was not the first one to attempt to base design criteria on concepts of spatial behavior. Alexander (63) introduced in his book, Community and Privacy, a prospect of basing housing design on privacy criteria to the extent of using computer programming.

Behavioral Units (Structured Behavior)

Unlike the spatial behavior (unstructured), is the concepts of "behavioral setting" and "behavioral circuit." These two concepts provide the possibility for even stronger implications of design criteria that are based on the view of architecture as adaptation.

Behavioral setting, as a concept discussed in Chapter I of this thesis, was first developed by Barker (68). This concept, in brief, is that behavior exist in some patterns can be viewed in terms of units of organism (human behavior) interaction with its milieu (environment). These units then consist not only of behavior but also of its surrounding--at once. This concept addresses a valuable suggestion to the design process; that is: instead of looking at abstract, usually meaningless, "space" as a design unit, designers should consider behavior setting as the primary design unit. By doing this, the physical setting will be designed as a collection of linked behavioral settings. The design criteria in the light of this view

will be people's performance and behavioral pattern within a specific context. This context may extend to their different culture, surroundings, status, etc. In this case, by using a specific behavioral setting, the designer can get rid of the stereotyped ideals about what every family should live like. He will be able to draw specific conceptual understanding in terms of a set of various behavioral settings. Accordingly, his design will be aiming to fit these behavioral units into its proper milieu. This fitness, in turn, will reflect the efficiency of the individual behavior within its unit (behavior setting).

The concept of behavior settings also helps designers to draw some generalities about the behavior patterns, as they represent the persistent and characteristic ones within a specific physical setting. The differences between one behavior setting and another are generally attributed to the variabilities of both the environment and people's culture, status, personality, and needs. Thus the human variables interplay with the other environmental variables (geometric, color, etc.) in order to identify a behavioral setting. Hence, if one knows about the characteristic of the behavior setting in general and information about the people's culture and behavior, he can draw a sketch of the appropriate physical milieu that can achieve this behavior setting. In this approach the

designer's image about the physical setting will be primary in terms of behavior setting.

Behavior circuits, on the other hand, as presented by Constance Perin (70) in her book, With Man In Mind, are a quite different concept of behavioral units or patterns. Behavior circuits are "routines" when they recur frequently at the individual level; they are "collaborations" when they involve other persons, and they are events when "the maintenance of various kinds of group relations occur, at any level of frequency" (Perin, 70:pp98-99).

> Recreation for the same person can be a routine, as in the morning jog; a collaboration, as in the weekly game of touch football; and an event, as in attending the World Series. Recreation for different age groups may show chiefly one kind of behavior circuit: morning jogging is routine for those over thirty-five; playing touch football is routine for fifteen-year-old boys; and attending night games an event for elderly men. (Ibid., 70:p99).

Behavior circuit should also be distinguished from the "circulation diagrams" drawn often by designers. Although they, similarly, involve movement, but they differ in that "circulation diagrams" is not concerned with more than movement and orientation. The concept of behavior circuit implies the aspects of quality of experiencing the trips through the specific personal or group behavior. It is by definition a behavioral unit (Perin, 70:p77). Behavior circuit, then, goes beyond orientation and movement, it delineates a human dimension that can be of greater help to designers.

Both the behavior setting and the behavior circuit, as units of structured behavior, are linked to the notion of adaptation. In many cases when these units of behavior occur in a physical setting that does not have a room for their size, dimension, or intensity, people use their imagination to adopt the space to fit to their behavior. If they succeed they make a remarkable change in the original design (which may become in conflict with other things). And if they fail, a destructive print of their attempt is often left over. In addition, they may also experience some sort of frustration. Examples of these adaptation aspects are when,

> people change settings to better support activities: to facilitate and sustain them. They may remove inappropriate props, such as built-in lights that are unadjustable, or add new ones, such as a back-yard barbecue pit to make eating out easier. For the same ends, they can alter the relations among settings - creating both new connections and separations, such as windows and walls. (Zeisel, 81:pl03).

Both behavior units relate more to efficiency as they already occur in a structured manner, particularly when a group is involved in them. However, when they happen at an individual level they relate both to freedom and efficiency of one's activity. Therefore, a design concerned with achieving efficiency and freedom at both individuals and groups must be <u>flexible</u>, in order to compromise both levels. The term flexible, here, means to be adaptable to variability of freedom and efficiency at both the group and individual level.

Conceptual Framework for Human Ecological Design

In the course of proposing a step toward human ecological approach of urban design and architecture, a synthesis addressed itself in this chapter. The previous sections have been attempting to do so both at the general and specific conceptual levels between architecture defined as adaptation and the current views of behavioral science. This section will sketch a framework toward a design process model within which the prospected theory of human ecological architecture can operate. This will be done by using the previous discussions.

The section will start by a brief discussion of the importance of theories and models in general and for design in particular. The discussion will attempt to develop an overall synthesis implicit in conceptual model. A set of conclusive recommendations for designers (implicit and explicit in the model) will end this section as it ends this chapter in the mean time. Finally, although the purpose of this section is not to develop a particular methodology for the design process, it will however, provide a conceptual framework that can be useful for that purpose.

Theories and Models

In order for an ecological human theory of architecture to exist, it should then have the minimum requirements that define a theory. Basically, a theory: "can be defined

as any kind of generalization or proposition that asserts that two or more things, activities or events vary in a complementary fashion under specified conditions" (Steiss, 74:p3). According to this definition, the general relationship proposed between man and his built-environment as based mainly on adaptation within a considered context, can be a theory. However, "theories are cheap: they cost only the time and effort of the theorists and these can be quite inexpensively" (Ibid., 74:p3). Therefore, the focus of attention should always be toward two basic questions: How the theory is articulated? and How this articulation can help utilizing the theory itself? The first question calls for a quick look at the meaning from which the world theory came from.

> 'Theory' is related to the world 'theorm', i.e., a proposition that is logically derived from other propositions, established through the application of deductive techniques. (Ibid., 74:p3).

This definition applies to, mainly, the field of mathematics. It also refers to one type of theory which is the "normative theory" that is based on mathematically derived propositions (theories that deal with what "ought to be" rather than "what is") (Ibid., 74:p4).

Theories, on the other hand, that are derived through an inductive process from empirical data or facts (more directly from observation and experimentation) are called "empirical theories" (Ibid., 74:p4). The reason for

distinguishing these two types of theories (one is concerned with facts and the other by empirical knowledge) is not to support one type over another. As Steiss (74), in his book Urban Systems Dynamics, indicated, it is important for the social scientist to consider both types of theories.

> To be 'scientific' is to be very much concerned with both theory and fact. Theory identifies the major orientation of a science by defining the kinds of data to be abstracted. It offers a conceptual scheme by which relevant phenomena are systematized, classified, and interrelated. Theory summarizes facts into empirical generalizations and systems of generalizations, and serves to identify gaps in the present state of knowledge. (Ibid., 74:p4).

Therefore, the proposed theoretical reorientation of architecture and design toward a human ecological theory of architecture should be articulated on both considerations (facts and theory). In other words, while using the logic of involving human criteria in designing human environment a considerable empirical theory should continuously take place through inductive process of research and experimentation. As such, the application of this theory will have two faces. One is the consideration of human and ecological factors in the design, and the second is the testing and adjustments to the theory itself, by adding new indications or developing new hypotheses.

At this point, it should be noted that this theory will face the same dilemma of the social science in general which is the nature of variables it will be dealing with. The question of quantitative and qualitative data and data

analysis. This dilemma can hardly find room in this thesis to be discussed, however, it should not be viewed as an obstacle for developing theories as techniques of better understanding our environment. This dilemma is merely a methodological one. For example, the purposive variables proposed in this thesis, which are freedom and efficiency of human activities, can be measured (quantified or qualified) in a whole range of different ways. In essence, this will depend upon the nature of the project and the dynamics and purpose of the research and design themselves.

While a theory, in general, stands between being a "law" (confirmed), and being a hypothesis (unconfirmed), a model can be used to refer at any of them. Furthermore, a model may mean a structural idea, a role, a relation, an equation, or as a synthesis of data (Echenique, 74:pl64). All of these other meanings of a "model," on the other hand, are linked to the process of building or testing a theory. Therefore, a "theory" and a "model" are linked to each other as they are means for understanding and presenting reality. In doing this, "only by being unfaithful in some respect can a model represent its original" because: "if it were not 'unfaithful' the model would be reality itself and not a representation" (Ibid., 72:pl65).

According to Echenique (72), in making a model, three classification questions arise: (1) What it is made for?; (2) What it is made of?; and (3) How the time factor

is treated? The answer to these basic questions are illustrated by Figure 12. The first aspect, is the intention the model is made for, classifies the models into four main types: descriptive model, predictive model, explorative model, and planning model. The descriptive model is aimed to understand and explain "reality."

> This type of model is logically essential to any other type, because it is not possible to predict, explore or plan without a previous description of the reality under study. (Ibid., 72:pl70).

While the main intention with the predictive model is to forecast the future, the predictive model is based on the assumption that the model represents the way reality is changing. With the planning model, however, "a measure of obtimisation is introduced in terms of chosen criteria in order to determine means of achieving stated planning goals" (Ibid., 72:pl70). The four types of models are linked to each other as they are all through the process of model-making relate to reality. These linkages and relation to reality are shown in Figure 13.

The second aspect of model-making is the "material" used to make the model. These can be classified as: materials (icons or analogues) and concepts (words or mathematical functions). The third aspect is the time treatment: either statically or dynamically.

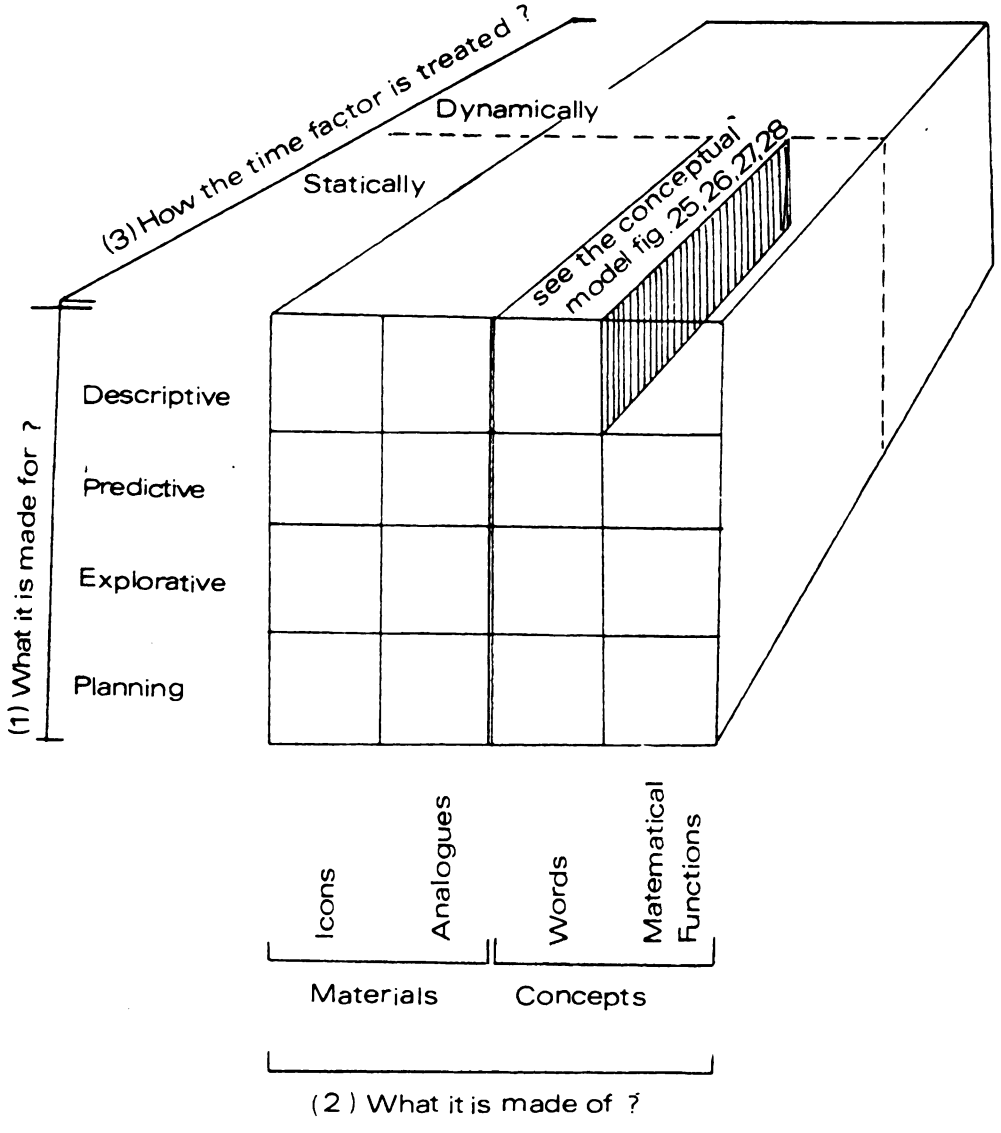

Figure 12.--Three-way Classification System for Models

SOURCE: Echenique, 72:p169

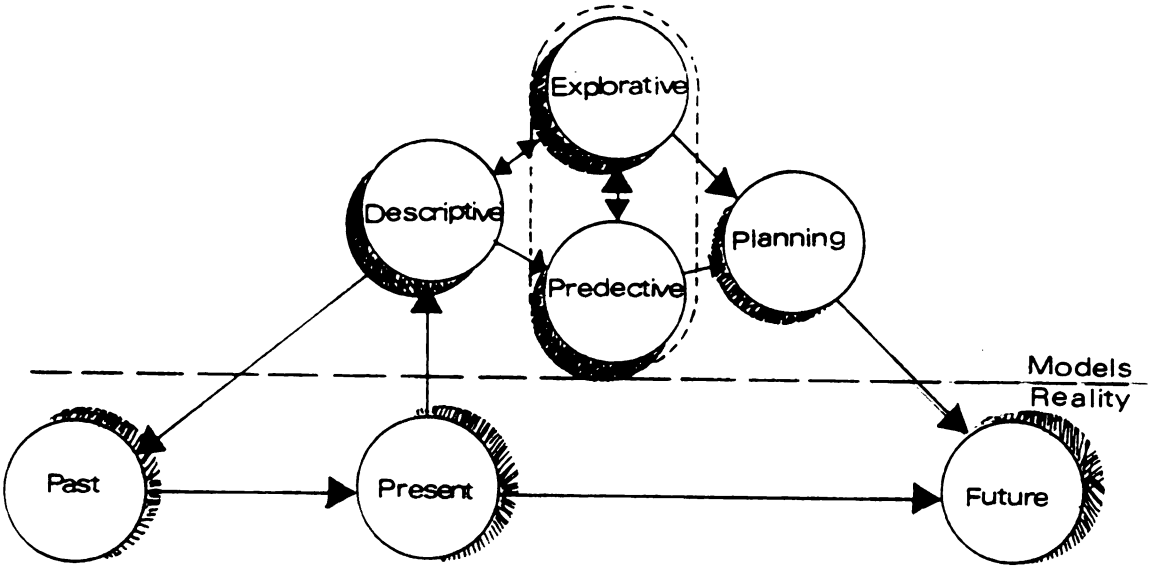

Figure 13.--Ideal Process of Model-making in Relation to Reality.

SOURCE: Echenique, 72: p172

The above discussion has already provided a framework within which a model of synthesis of ideas developed earlier in this chapter can be sketched.

A Conceptual Descriptive Model

A theory of human ecological architecture, in it's infancy, needs a basic synthesis at different conceptual levels. This was the aim of the early discussion of this chapter. The central concept that was used in this synthesis was the proposed human adaptive (purposive) variables emerged from defining architecture as adaptation --efficiency and freedom. This was done throughout a range of different behavioral concepts both at the general and specific level of analysis. In order to sum up all these

concepts as they interrelate to each other in a "synthesis" fashion, a descriptive model will be developed. This model by nature is a conceptual one, thus it will be made of words, and it will treat time statically.

The idea of the model is to use the definition of the term "continuum," used previously in this thesis (the meaning of perception in Chapter III, and again early in this section) to illustrate several concepts. The term "continuum" refers at "something in which no part can be distinguished from neighboring parts except by arbitrary division" (according to the American Heritage Dictionary, P. Davies, 77). The concept of a "continuum" can be useful to draw some generalities, since, it is difficult to obtain a good fit between model and reality,

> especially in the social science, because each fact or value presupposes a considerable amount of data which is either not available or requires very large resource to obtain. On the other hand, the accuracy of the model itself in a particular situation is likely to be in contradiction to generality, a property that any theory must have. (Echenique, 72:p170).

The model, as shown in Figures 14, 15, 16, and 17, is based on the following key:

1. The model has four different phases, these are: contextual, socio/economic, behavioral, and cultural design phase.

2. Each horizontal continuum represents three different, although inseperable and related, meanings of

one concept.

3. These horizontal continuums are parallel to each other and they are related in such a way that:

4. The vertical linkages are thought to be the primary relations between the different concepts and elements.

5. The diagonal linkages are assigned for the secondary relations.

6. The right and left side of each continuum relate to each other more than they relate to the central element or concept.

7. The central continuum used in the different schemes of the model is the efficiency/freedom of human activity as the two purposive variables based on the view of architecture as adaptation.

8. Each circle represent one concept with its different aspects.

9. The first two schemes of the model deals with a human ecological perspective.

10. The third and fourth schemes are dealing with behavior/culture/design perspective.

11. This model should be looked at as an attempt to synthesize a conceptual framework between a whole range of concepts of human context, behavior, culture, and shelter or design with two evolutionary variables, in the course of steping toward a theory of human ecological architecture

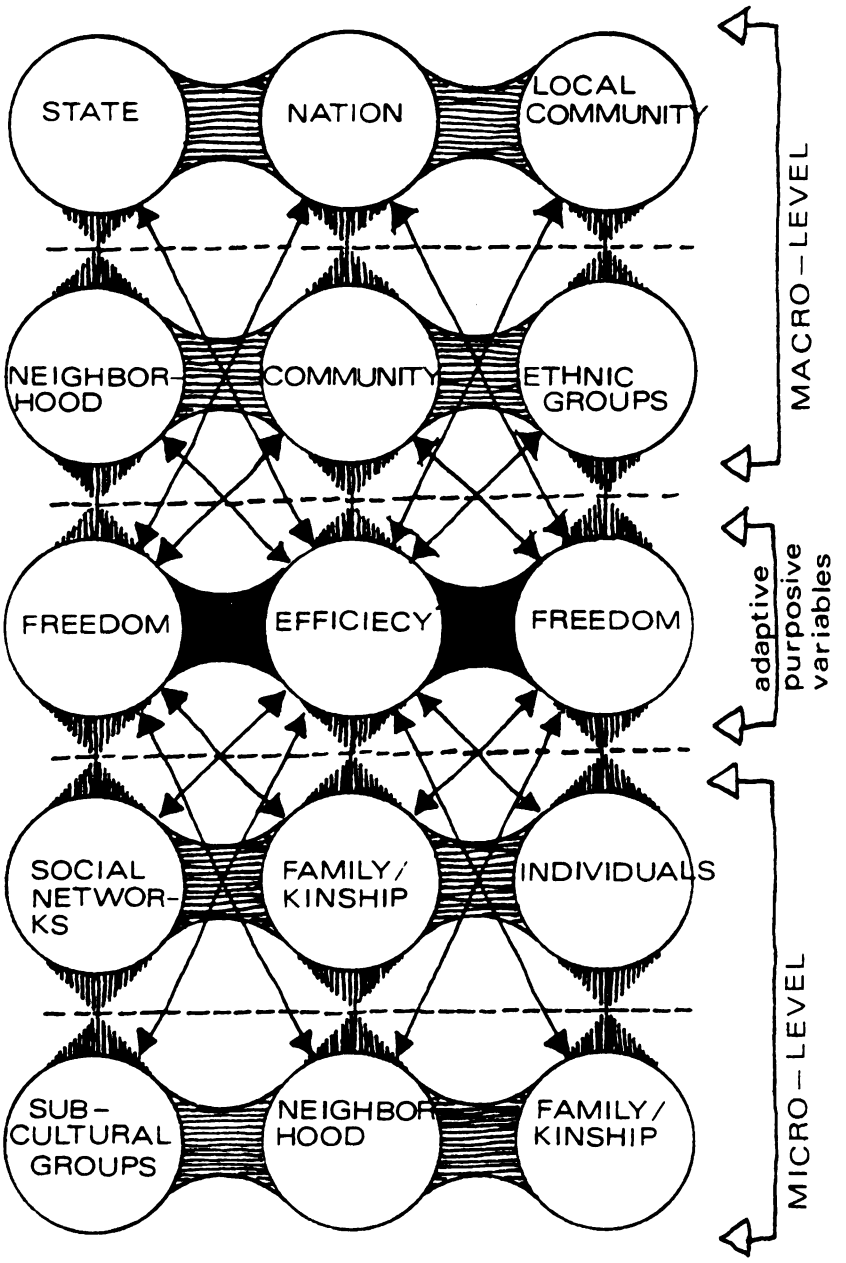

Figure 14.--A Conceptual Model (1): The Contextual Scheme.

SOURCE: The Author

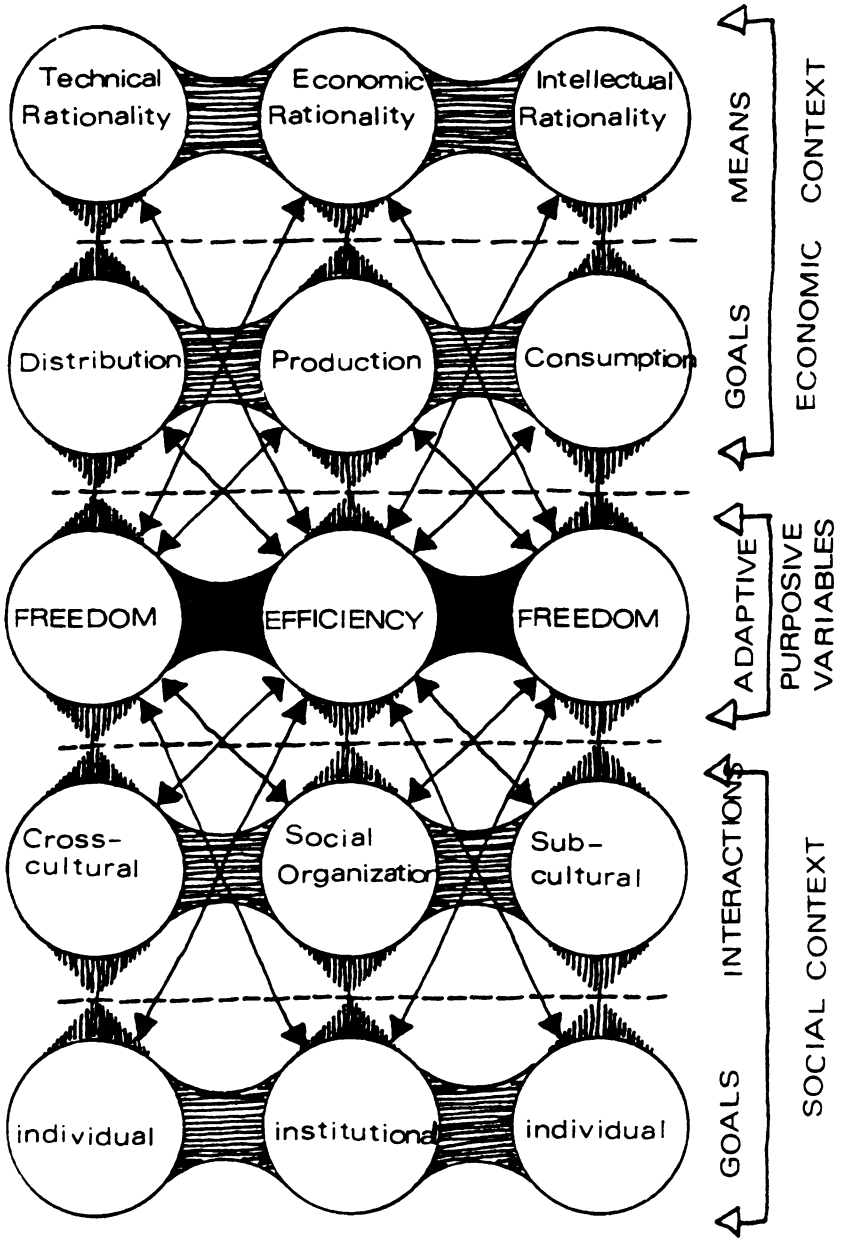

Figure 15.--A Conceptual Model (2): The Social/ Economic Organizational Scheme.

SOURCE: The Author

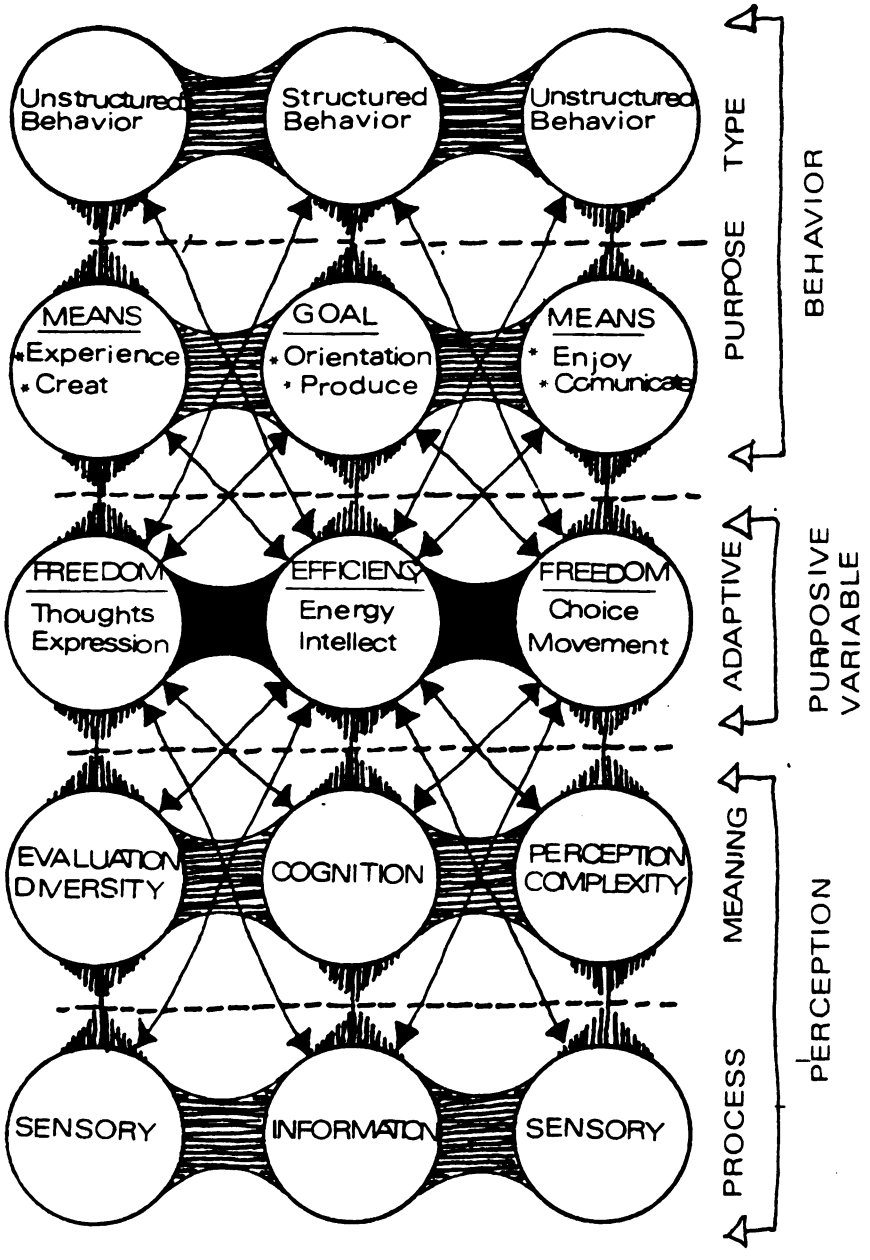

Figure 16.--A Conceptual Model (3): The Behavioral/ Perception Scheme.

SOURCE: The Author

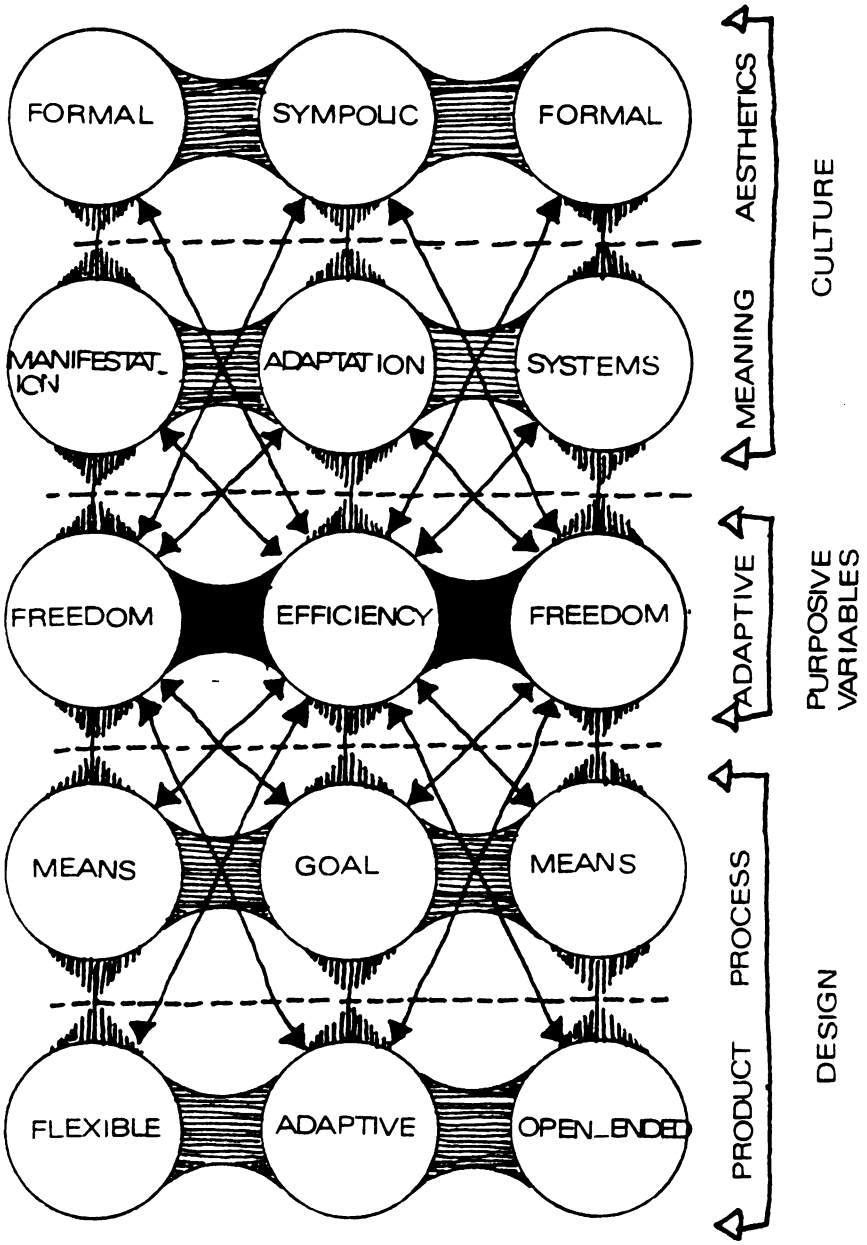

Figure 17.--A Conceptual Model (4): The Cultural/ Design Scheme.

SOURCE: The Author

and design.

12. Therefore, this model is aimed primarily toward two purposes. One is to set a pool of concepts from which hypotheses and continual research can extend. Second, is to serve as a frame of reference for architects and planners who want to develop design criteria in the light of human ecological perspective.

13. If these two purposes are achieved a closing of the gap between social scientists, and architects and planners, will result as they both espouse a common theoretical ground.

This model then serves as a descriptive tool of the conceptual synthesis which is geared toward the suggested reorientation toward a human ecological theory of architecture. By using the same descriptive mechanism a design process model can be, also, developed.

A Design Process Model

The above discussion has already suggested a closing of the gap between researcher (behavioral scientist) and the designer (architect or planner). This can happen by integrating the information and finding of the research into the design process itself. By doing this, the designer can scientifically develop hypothesis and witnesses then tested throughout the process. This suggestion is based on assuming that the design process is already a continual

one (open-ended). The researcher on the other hand, can use the design process to "empirically" examine his hypothesis and theories. This can happen if the actual design problems and questions are made explicit by the designers. Unless designers have interest in assuming and considering the importance of the relationship between behavior and the built-environment, they will be reluctant to provide researchers with useful research questions and problems. For this reason, this thesis has focused on the possibility for designers to reorient their view of the built-environment behavior relations, as a basic step toward possible cooperation with researchers from behavior science. This is the first fundamental step toward the development of a design process that can be the operational framework of the human ecological perspective which is shown in Figure 18 as suggested by Zeisel (81). This first scheme of the design process, in the form of cooperation between researchers and designers, is one which allows for the development of empirical knowledge about man in his built-environment.

The means to achieve this scheme require that both designers and behavior scientist understand each other's problems and professional nature and characteristics. On one hand the design process traditionally has three elementary activities, these are: imaging, presenting, and testing (Zeisel, 81:p6).

Imaging is similar to the concept of image that everyone experiences, but in this case the designer image a solution to his problem in terms of mental picture of both the context and the form. At this point the researcher should be able to supply the designer with the type of information about human behavior that can be useful for the designer's images. This design activity (imaging) is the key one, that if changed and shifted to be "human activities" and "behavior" oriented instead of "geometric forms" and "space" oriented, the processes of representation and testing will accordingly follow these criteria. This can be done by developing behavioral units and criteria in an image form. By doing this the designer will be able to image the activities within the space, instead of using stereotyped images, like land use and building categories and names. They could then create a new system of images that view the design elements in terms of what actually "it is people do in the environment" (Perin, 70:p97). This can be the responsibility of the researchers to be able to provide their findings and information in such a way that designers can use for their imaging process.

The major problem that actually can maintain the gap between researchers and designers is their clients and the problems of who pays for the service? and why? This problem, although, varies from one situation to another, it stems from the political, economic, and social

environment within which both researchers and designers operate. However, the key solution to this problem is in the hand of both professions, in terms of how much they commit themselves to this approach.

Another professional dilemma still faces both the designers and researchers; that is the gap between them and the real users of the built-environment. A "citizen participation" concept, then, addresses itself to close this gap. However, this is not quite enough, because,

> every design decision has political implications. Middle class home-owners are in favor of public housing - somewhere else. They believe there should be a place where teen-agers can obtain help for drug problems as long as it is located - somewhere else. A new factory in town will be good for business but it is going to take over the last unused bit of river bank. A new city hall will help give the town a better image but it may not be worth those extra taxes. (Sommer, 72:p133).

Therefore, what Sommer (72) has called "design awareness," should extend beyond the designers and researchers to the users. This can be done by informing people about the latest research findings and about the different steps of the design process as it develops different options and alternatives. This basic step is what Sommer (72) called "environmental workshops." The professional limitations facing architects and designers can be overcome if this kind of awareness among the users is promoted. By this "awareness," the process of getting people involved in the design process (citizen participation) can be meaningful,

and useful. This step can also be represented in a model shown in Figure 19.

The realization of the above two schemes of the design process (shown in both Figure 18 and Figure 19), hence, can be "rational." On one hand, it can attain the analytical, critical sense of rationality by integrating a research process into its cycle, and on the other hand by facing the users and their real needs by having them aware and involved in the design process.

Summation

This final chapter of this thesis has developed a possibility for steps toward a theory of human ecological architecture. The following points describe these possibilities:

(1) In a general conceptual level, the concept of architecture as adaptation with its developed two "purposive" variables--freedom and efficiency of the human activity relate to behavior, especially viewed by the current trends of the behavioral science.

(2) Also a synthesis between the concept of architecture and design as adaptation and behavior at a specific conceptual level was possible to make. This involved two main categories of behavior; structured behavior (units) such as behavioral setting and behavioral circuit; and unstructured behavior (spatial) such as

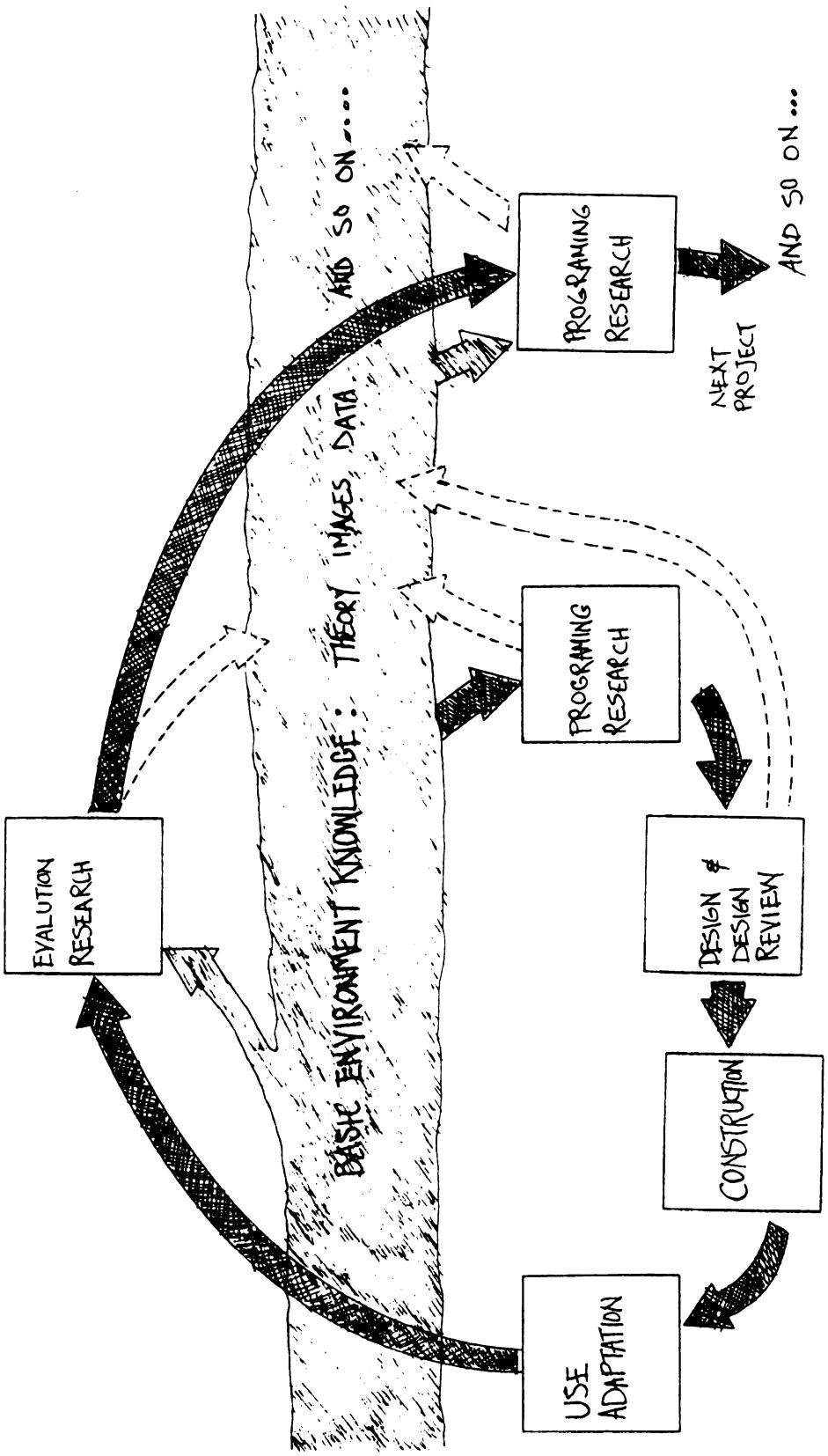

Figure 18.--A Design Process Model (1): Design/Research Cooperation Scheme.

SOURCE: Zeisel, 81:p36

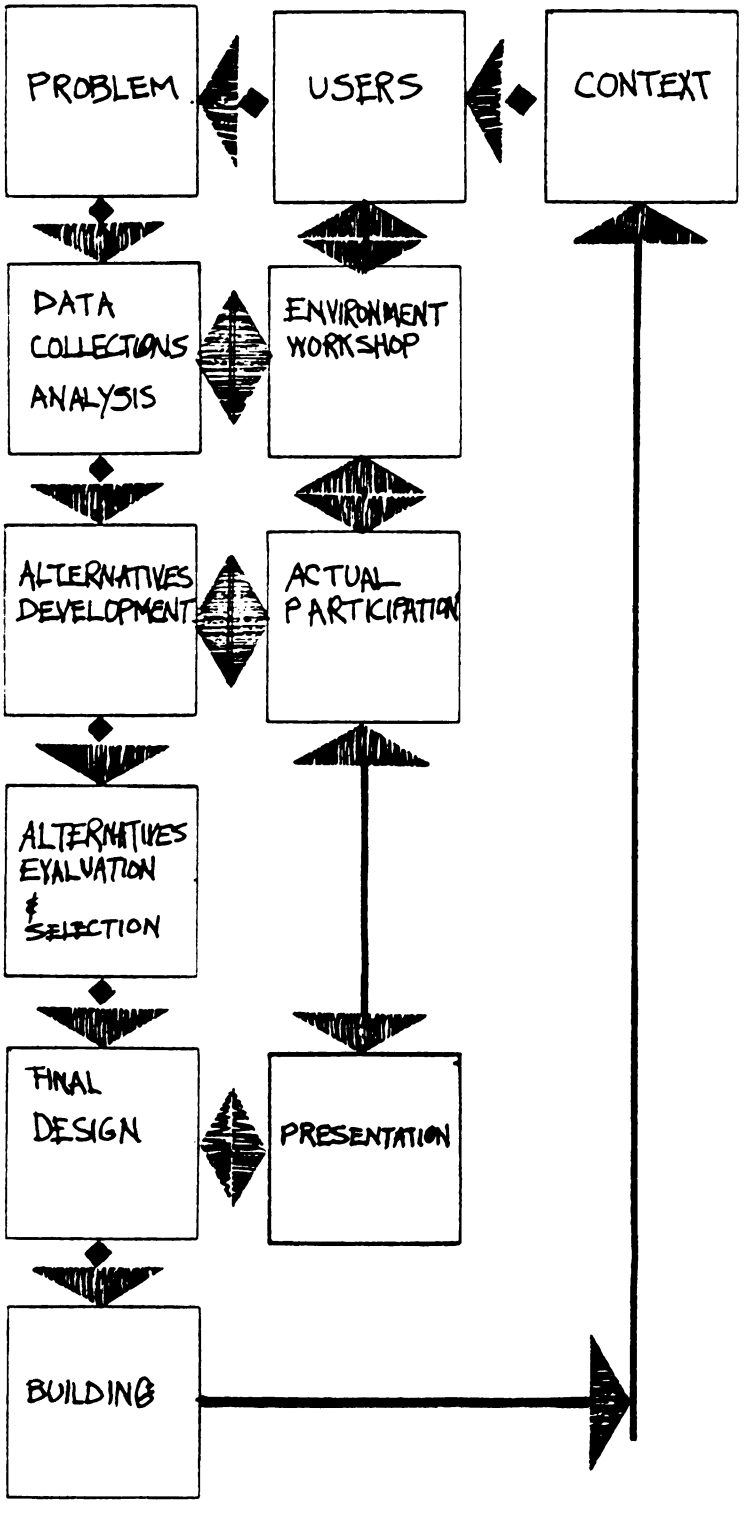

Figure 19.--A Design Process Model (2): Design With People.

SOURCE: Author

personal space, privacy, crowding, territoriality, and defensible space.

(3) This synthesis has revealed a diversity between efficiency and freedom (of human activity) if viewed at different contextual levels (individual, group, society).

(4) A conceptual descriptive model was then introduced in an attempt to show this diversity between efficiency and freedom as purposive variables and a range of different concepts and ideas. Basically, contextual synthesis was represented by two schemes of the model and behavior/culture/design synthesis was represented by two other schemes. This conceptual model, by indicating how different concepts relate to each other, can be a bases for closing the theoretical gap between the designers in the environmental design fields and researchers in the behavior science fields.

(5) In the light of this approach, a proposed model of the design process was introduced. This model, indicates two consequences or implications of the human ecological design approach, represented in two schemes. First scheme is a possibility for occasions of cooperation between designers and researchers in the design process, as proposed by Zeisel (81). Second scheme is indicating the importance of the users participation in the design process.

CHAPTER IV

SUMMARY AND CONCLUSIONS

The impetus for this thesis was a concern of our urban environment, particularly the built-environment and how it relates to people. This concern is emerging in a variety of academic disciplines in corresponding to the fast technological and social change shaping the contemporary world. This thesis, therefore, has lent itself toward searching for steps to take in order to bring a desired and crucial awareness to the milieu of design, planning and architecture. This awareness was thought of to be a revision of the theoretical premises of the deterministic approach, often, used by urban designers and architects. This has, thus, called for the research to go beyond the boundaries of these fields into the realm of the emerging behavior science that, already, includes psychology, anthropology, sociology and philosophy. The discussions that were presented focused on the theoretical gap between the environmental design fields and the behavior science fields in view of the relationship between human behavior and the built-environment. This focus has two main topics.

The first topic was the human behavior built-environmental relations, in which an extensive review of the current related theoretical attitudes and concepts toward it is laid out. This allowed for providing a reason to reconsider the architectural determinism. The second topic was steps toward a formulation of a new theoretical attitude in architecture and design that is parallel to the current view of behavioral science; that is human ecological.

These steps were not in themselves methodologies or practical tools, rather they were conceptual synthesis on different levels of analysis that can lead to further methodological development in the design process. Therefore, the work that has been completed up to this point should be considered as a conceptual framework model of how the planner, the designer and the architect may view man in his built-environment. Moreover, this conceptual framework is aimed to bridge the theoretical gap between designers and researchers (as indicated). Finally, it should be noted that bridging this theoretical gap between the two fields (design and behavior science) is only one side of the problem of the lack of cooperation between them. The other side of this problem is a professional gap which can be bridged, maybe by a different approach that will deal with the social, political and economic factors of this problem.

The first chapter of the thesis has lent itself to the question of how the environment in general and the built-environment in particular relates to people? By doing so, it has raised and concluded the following points.

(1) There are three major philosophical/theoretical attitudes toward man-environment interactions. One is that the environment controls and determines man's behavior; the second is that behavior determines and constructs the environment; and the third is that both environment and human behavior are mutually interrelated.

(2) The third attitude is representing the current trend in the emerging behavior science. However, the limitation facing this trend is the narrow scope of analysis that does not go beyond the individual level.

(3) Therefore, the ecological approach that calls for multi-level analysis is gaining a larger creditability in that it tries to remove the persisting theoretical limitations. This can be achieved by the use of the concept of behavioral settings developed by Barker (69).

(4) Culture is also a major factor to consider within this view, the thing that calls for the need for cross-cultural analysis at all the different levels.

(5) Culture has three dimensions to look at. These are as manifestation, as systems, or as adaptation. The important point is that these dimensions complement each others and without considering their importance

a cultural-ecological approach will have a short coming.

Finally, this section has developed an overview of the possible relations between man and his built-environment. The underlying message this overview has developed was the need for a corresponding response and reorientation of the architectural and design theory.

In response to this message developed above, the second chapter has concentrated on reconsidering the architectural and urban design theory. In doing this the following conclusions were arrived at.

(1) In order for a "rational design process" to cope with the scientific rationality, and as it delivers means of communication (non-verbal communication) it should be based on considering people's behavior and interactions as its basic criteria. Its goal should be the fitness of man and his needs into the context of the design form, and its means are scientific or critical (analytical) methods of understanding both the human behavior and its context.

(2) The deterministic approach of the design and architectural theory has resulted theoretical and professional limitations.

(3) The theoretical limitations stem from the reluctance of architects to question what they are doing. This has resulted no advances in their theory. Also, by

not getting involved in research activities they isolated themselves from the social and behavioral scientists.

(4) The professional limitations are best described by the gap between the designer and the user.

(5) Therefore, in order for the architectural limitations to be removed, and the design process to be "rational," a reorientation in its theory is inevitable. This reorientation can start by redefining architecture in terms of cultural adaptation.

(6) By doing this, a bridge between the architect, designer, and planner and the social scientist could be built which also will result advances in the theoretical and technical knowledge of the two fields. It will, also, result a better built-environment.

(7) For this reorientation in the theory of architecture, chapter four has suggested a synthesis between architecture defined as: art-science of design-constructing adaptive spaces and structures that maximize the efficiency and freedom of human activities in a human ecological context, that is defined by the particular environment, in terms of social, technological, and political and economical organization of that environment and its linkage to other local, regional, state, national or international levels of interactions, and the different theoretical premises of the ecological approach developed in the field

of behavioral science. This can be done by using the two "purposive variables" freedom and efficiency of human activities.

The third chapter of the thesis has, thus, attempted to draw this synthesis at two different levels. The first is at the general theoretical level and the second is the specific conceptual one. The following are the findings of this chapter:

(1) There is a possibility of a conceptual synthesis between architecture as cultural adaptive tool using the two "purposive" variables freedom and efficiency, and behavioral science at two levels; general and specific.

(2) A conceptual descriptive model was possible to develop in order to lay out this synthesis in four schemes. The first and second schemes indicated a contextual synthesis while the third and fourth schemes demonstrated behavior/culture/design synthesis.

(3) According to these possibilities of a synthesis and also according to the recommendations derived from the meaning of rationality, a design process model was developed to illustrate the possibility to apply these concepts in a practical way. This was not a methodology of design, rather it was descriptive mechanism of the cooperation between designers and the social scientists at one scheme and people at another.

The chapter can then be a proposed solution to the problem of the increasing unbalance between man and his built-environment that is resulted from the lack of architectural theory that consider human behavior and needs as its basic criteria. This solution can also contribute to our body of knowledge (technical/theoretical) about man-built-environment relations.

Finally, it should be again noted that this thesis is a step toward more awareness of not only our environment but also our knowledge about the environment that should be enhanced and increased for this awareness to exist. This awareness can start with not only the architecture design or planning students it should be at a larger scale to include everyone in a way that C. Allexander (77) called "A Pattern Language."

REFERENCES

REFERENCES

Abel, Chris. 1980. Meaning and Rationality in Design. In Meaning and Behavior in the Built-Environment. eds. Geoffrey Broadbent. Richard Bunt. and Tomas Llorens. New York: John Wiley & Sons.

Ackoff, Rusell L. 1974. Redesigning the Future. New York: John Wiley & Sons.

Alexander, Christopher, et. al. 1977. A Pattern Language. New York: Oxford University Press.

Alexander, Christopher. 1964. "Notes on the Synthesis of Form." Cambridge, Mass.: Harvard University Press.

Alexander, Theron. 1973. Human Development in an Urban Age. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Allsopp, Bruce. 1974. Towards a Human Architecture. London: Fredrick Muller Limited.

Arnheim, Rudolf. 1971. Gestalt Psychology and Artistic Form. In Aspects of Form. ed. Lancelot Law Whyte. New York: American Elsevier Publishing Company, Inc.

Banham, Reyner. 1976. Megastructure, Urban Futures of the Recent Past. London: Thames and Hudson.

Banham, Reyner. 1960. Theory and Design in the First Machine Age. New York: Praeger Publishers.

Baron, Reuben M. and Rodin, Judith. 1978. Personal Control as a Mediator of Crowding. In Advances in Environmental Psychology, Volume 1 The Urban Environment. eds. Andrew Baum. Jerome Singer. and Stuart Valins. Hillsdale, New Jersey: Lawrence Erlbaum Associates, Publishers.

Barker, Roger G. 1968. Ecological Psychology. Stanford, Cal.: Stanford University Press.

Berry, John W. 1980. Cultural Ecology and Individual Behavior. In Human Behavior and Environment. eds. Irwin Altman. Amos Rapoport. and Joachim F. Wohlwill. (Advances in Theory and Research, Vol. 4, Environment and Culture.) New York: Plenum Press.

Blake, Peter. 1969. Forward. In Arcology: The City in the Image of Man. by Soleri, Paolo. Cambridge, Mass.: The MIT Press.

Boulding, Kenneth. 1956. The Image. Ann Arbor: The University of Michigan Press.

Chemayeff, Serge. and Alexander, Christopher. 1963. Community and Privacy. New York: Anchor Books Doubleday & Company, Inc.

Deasy, C. M. 1974. Design for Human Affairs. New York: A Schenkman Publication, Halsted Press Division.

Doxiadis, C. A. et. al. 1974. Anthropolis, City for Human Development. New York: W. W. Norton & Company, Inc.

Echenique, Marcial. 1972. Models: A Discussion. In Urban Space and Structures. eds. Leslie Martin. and Lionel March. London: Cambridge University Press.

Ficker, Victor B. and Graves, Herbert S. 1978. Social Science and Urban Crises. New York: Macmillan Publishing Co., Inc.

French, Jere Stuart. 1978. Urban Space. Iowa: Kendall-Hunt Publishing Company.

Gallion, Arthur B. and Eisner, Simon. 1980. The Urban Pattern. New York: D. Van Nostrand Company.

Goodman, Robert. 1971. After the Planners. New York: Simon and Schuster.

Hall, Edward T. 1966. The Hidden Dimension. Garden City, New York: Doubleday & Company, Inc.

Heimsath, Clovis. 1977. Behavioral Architecture. New York: McGraw-Hill Book Company.

Holahan, Charles J. 1978. Environment and Behavior. (The Plenum Social Ecology Series. Series editor Rudolf Moos.) New York: Plenum Press.

Ittelson, William H. ed. 1973. Environment Perception and Contemporary Perceptual Theory. In Environment and Cognition. New York: Seminar Press.

Jarvie, I. C. 1968. Utopian Thinking and the Architect. In Planning for Diversity and Change. ed. Stanford Anderson. Cambridge, Mass.: The MIT Press.

Jenks, Charles A. 1977. The Language of Post-Modern Architecture. New York: Rizzoli International Publications, Inc.

Kaplan, Stephen and Kaplan, Rachel. 1978. Coping Strategies: Choice and Control. In Human-scape, Environments for People. eds. Stephen Kaplan and Rachel Kaplan. North Scituate, Mass.: Duxbury Press.

Kaplan, Stephen. 1976. Adaptation Structure, and Knowledge. In Environmental Knowing Theories, Research, and Methods. eds. Gary T. Moore and Reginald G. Golledge. (In Community Development Series, Vol. 23, ed. Richard P. Dober.) Stroudsburg, Penn.: Dowden, Hutchinson & Ross, Inc.

Lang, Jon et. al. ed. 1974. Emerging Issues in Architecture. In Designing for Human Behavior: Architecture and the Behavioral Sciences. eds. Jon Lang. Charles Burnette. Walter Moleski. and David Vachon. (Community Development Series, Vol. 6, series ed. Richard Dober.) Stroudsburg, Penn.: Dowden, Hutchinson & Ross, Inc.

LeCorbusier. 1954. The Modular. Cambridge: Harvard University Press.

LeCorbusier. 1927. Towards a New Architecture. London: Architectural Press.

Lorenz, Konrad Z. 1968. The Role of Gestalt Perception in Animal and Human. In Aspects of Form. ed. Lancelot Law Whyte. New York: American Elsevier Publishing Company, Inc.

Lynch, Kevin. 1960. The Image of The City. Cambridge, Mass.: The Technology Press & Harvard University Press.

Moholy-Nagy, Sibyl. 1968. Matrix of Man. New York: Frederick A. Praeger, Publishers.

Moore, G. T. 1976. Theory and Research on the Development of Environmental Knowing. In Environmental Knowing. eds. Gary T. Moore. and Reginald G. Golledge. (In Community Development Series, Vol. 23, ed. Richard P. Dober.) Stroudsburg, Penn.: Dowden, Hutchinson and Ross, Inc.

Moore, G. T. and Golledge, R. G. 1976. Environmental Knowing: Concepts and Theories. In Environmental Knowing. eds. Gary T. Moore. and Reginald G. Golledge. (In Community Development Series, Vol. 23, ed. Richard P. Dober.) Stroudsburg, Penn.: Dowden, Hutchinson and Ross, Inc.

Morris, A. E. J. 1972. History of Urban Form. London: George Godwin Ltd.

Morrison, Bonnie Maas. 1974. The Importance of a Balanced Perspective: The Environment of Man. Man-Environment Systems. Vol. 4, No. 3, pp. 171-178.

Mumford, Lewis. 1961. The City in History. New York: Harcourt, Brace, and World, Inc.

Newman, Oscar. 1972. Defensible Space. New York: The Macmillan Company.

Overton, Willis F. and Reese, Hayne W. 1977. General Models for Man-Environment Relations. In Ecological Factors in Human Development. ed. Harry McGurk. New York: North-Holland Publishing Company.

Palen, J. John. 1975. The Urban World. New York: McGraw-Hill Book Company.

Parr, A. E. 1970. In Search of Theory. In Environmental Psychology. eds. Harold M. Proshansky. William H. Ittelson. and Leanne G. Rivlin. New York: Holt, Rinehart and Winston, Inc.

Perin, Constance. 1970. With Man In Mind. Cambridge, Mass.: The MIT Press.

Polanyi, Michael. 1959. The Study of Man. Chicago: The University of Chicago Press.

Pond, Irving K. 1918. The Meaning of Architecture. Boston: Marshall Jones Company.

Porteous, Douglas J. 1977. Environment and Behavior: Planning and Everyday Urban Life. Reading, Mass.: Addison-Wesley Publishing Company.

Proshansky, Harold M. Ittelson, William H. and Rivlin, Leanne G. 1970. The Influence of the Physical Environment on Behavior: Some Basic Assumptions. In Environmental Psychology: Man and His Physical Setting. eds. Harold M. Proshansky. et. al. New York: Holt, Rinehart and Winston, Inc.

Prokop, Dieter. 1967. Image and Function of the City. In Urban Core and Inner City. ed. Michel H. M. von Huten. Leiden, Netherlands: E. J. Brill.

Quantrill, Malcolm. 1974. Ritual and Response in Architecture. London: Lund Humphries.

Rapoport, Amos. 1980. Cross-Cultural Aspects of Environmental Design. In Human Behavior and Environment. eds. Irwin Altman. Amos Rapoport. and Joachim F. Wohlwill. (In Advances in Theory and Research, Vol. 4, Environment and Culture.) New York: Plenum Press.

Rapoport, Amos. 1977. Human Aspects of Urban Form. Oxford: Pergamon Press.

Rapoport, Amos. 1976. Environmental Cognition in Cross-Cultural Perspective. In Environmental Knowing, Theories, Research, and Methods. eds. Gary T. Moore. and Reginald G. Golledge. (In Community Development Series, Vol. , ed. Richard P. Dober.) Stroudsburg, Penn.: Dowden, Hutchinson and Ross, Inc.

Schwartz, Barry. 1972. The Social Psychology of Privacy. In People and Buildings. ed. Robert Gutman. New York: Basic Books, Inc., Publishers.

Sjoberg, Gideon. 1980. The Preindustrial City: In Urban Life. eds. George Gmelch. and Walter P. Zenner. New York: St. Martin's Press.

Smith, Peter F. 1979. Architecture and the Human Dimension. London: George Godwin Limited.

Soleri, Paolo. 1969. Arcology, the City in the Image of Man. Cambridge, Mass.: The MIT Press.

Sommer, Robert. 1969. Personal Space: The Behavioral Basis of Design. Englewood Cliffs, N. J.: Prentice-Hall, Inc.

Sommer, Robert. 1972. Design Awareness. San Francisco: Rinehart Press.

Sorokin, Pitirim A. 1962. Society, Culture and Personality. New York: Cooper Square Publishers, Inc.

Spreiregen, Paul D. 1965. Urban Design: The Architecture of Towns and Cities. New York: McGraw-Hill Book Company.

Stea, David. 1974. Architecture in the Head: Cognitive Mapping. In Designing for Human Behavior: Architecture and the Behavioral Sciences. eds. Jon Lang. Charles Burnette. Walter Moleski. and David Vachon. (Community Development Series, Vol. 6, series ed. Richard Dober.) Stroudsburg, Penn.: Dowden, Hutchinson & Ross, Inc.

Stea, David. 1965. Space, Territoriality, and Human Movement. Landscape. 15:13-16.

Steiss, Alan Walter. 1974. Urban System Dynamics. Lexington, Mass.: Lexington Books, D.C. Heath and Company.

Thorndyke, Perry W. 1980. Performance Models for Spatial and Locational Cognition. Santa Monica, Cal.: Rand Corporation.

Willems, Edwin P. 1977. Relations of Models to Methods in Behavioral Ecology. In Ecological Factors in Human Development. ed. Harry McGurk. New York: North-Holland Publishing Company.

Zeisel, John. 1981. Inquiry by Design. Tools for Environmental-Behavior Research. Monterey, Cal.: Brooks/Cole Publishing Company.