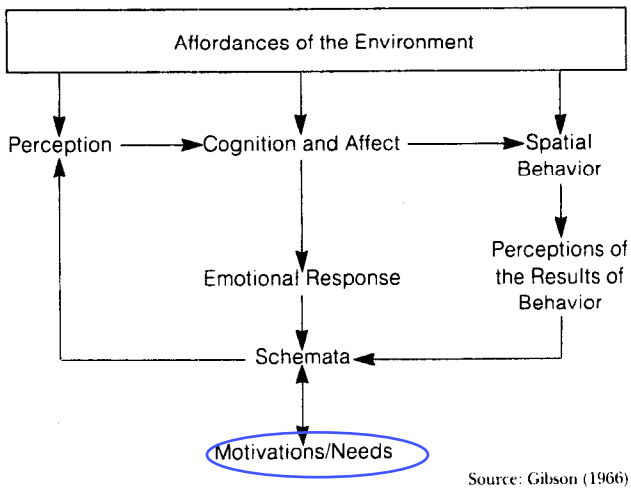
9

FUNDAMENTAL PROCESSES OF HUMAN BEHAVIOR

The work of environmental designers is very much influenced by their concepts of human nature. These have varied during history. At one time people are perceived as being free-willed, at another as controlled by their environments. The latter view was central to the thinking of the Modernists in architecture and remains so in much architectural theory today. During one period people are believed to be rational, at another irrational (Neisser 1977). This difference is reflected in the differences between first- and second-generation models of the design process. Anthropological, sociological, and psychological research has reduced some of the mysteriousness of human behavior but much remains unknown. Our present understanding does, however, clarify much about the person-environment interface and thus about environmental design.

The environment is potentially rich in affordances for human experiences and behavior. The basic processes involved in the interaction between people and their environment are shown in figure 9-1. Information about the environment is obtained through perceptual processes that are guided by *schemata* motivated by *needs.* These schemata are partially innate and partially learned. They form the linkage between *perception* and *cognition.* They guide not only the perceptual processes but also emotional responses *(affect)* and actions *(spatial behavior),* which in turn affect the schemata as the outcomes of behavior are discerned. Human feelings and actions are limited by the affordances of the natural and built environments, the cultural environment, and the intrapsychic states of the people concerned.

The explanation of these processes of behavior is inevitably guided by an overall concept or schema. That given here has been called the "environmental perception and behavior approach" (Patricios 1975). It is a model that focuses on individuals and groups of individuals. This can be contrasted with models that deal with aggregates of people as individuals. The approach used here deals with the fac-



9-1. The Fundamental Processes of Human Behavior.

tors underlying behavior at the scale of buildings, urban complexes, and open spaces rather than at a regional scale.

Within the "environmental perception and cognition approach," there are different theories of perception, cognition, and spatial behavior. These theories, although based on research, are often highly speculative and untested. It is important for the designer to understand them so that their implications for the concerns of environmental design can be comprehended. In presenting these theoretical issues, stress will be placed on what designers need to know, and on what we do and do not know in order to clarify positive environmental design theory. The discussion will proceed from *motivation* to *perception* to *cognition and affect* to *spatial behavior* to the subject of *individual differences* in behavior.

MOTIVATION

Motivation is the guiding force behind behavior. Behavior is directed toward the satisfaction of needs. Therefore it is important for environmental design theory to be based on some concept of human needs. A number of such models exist (such as H. Murray 1938, Maslow 1943, 1954, Erikson 1950, Fromm 1950, Whiting and Child 1953, A. Leighton 1959). They all attempt to explain "internal forces"—physiological and psychological, conscious and unconscious—and types of needs from the most basic to the loftiest. Two of the models especially have been used by environmental designers in thinking about what the built environment should afford people: Alexander Leighton's scale of *essential striving sentiments* (1959), and Abraham Maslow's *hierarchy of human needs* (1943, 1954).

Leighton's model has been found by certain writers to be a "convenient handle" for understanding the nature of the built environment with respect to humans (Alexander 1969, Perin 1970). Leighton identifies the following needs: (1) physical security, (2) sexual satisfaction, (3) the expression of hostility, (4) the expression of love, (5) the securing of love, (6) the receiving of recognition, (7) the expression of spontaneity, (8) orientation in terms of one's place in society and the places of others, (9) the securing and maintenance of membership in a definite group, and (10) belonging to a moral order. Some of these needs have to do with what the environment affords at an instrumental level (for example, security, the expression of spontaneity), and others at a symbolic level (for example, recognition, membership). The list is, however, cumbersome and is not ordered in an explicit fashion. Maslow's model, though similar to Leighton's, is easier to relate to the concerns of environmental design.

Maslow suggests that there is a hierarchy of needs from the strongest to the weakest, with the stronger taking precedence over the weaker. His hierarchy from strongest to weakest is as follows: *physiological needs*, such as hunger and thirst; *safety needs*, such as security and protection from physical harm; *belonging and love needs*, such as membership in a group and the receiving of affection; *esteem needs*, those desires of an individual to be held in high value by himself or herself and others; *actualization needs*, representing the desire to fulfill one's capacities; and *cognitive and aesthetic needs*, such as the thirst for knowledge and the desire for beauty for its own sake.

This classification provides a framework for thinking about the concerns of environmental design and for the concerns of the designer. The built environment provides for human physiological needs, such as shelter; for safety needs, physical and psychological security; for belonging and esteem needs, through environmental symbolism as well as through specific sets of activities; for actualization needs, through the freedom of choice; for cognitive needs, through access to opportunities for development; and for aesthetic needs, through formal beauty. Much that contributes to the meeting of these needs, however, has very little to do with the built environment.

Some needs are physiologically based, some are sociologically or psychologically based, and some are a mixture. The more basic needs are physiologically based; the need to belong may have a physiological component but is socially and culturally biased, whereas the need for self-actualization and cognitive and aesthetic needs are largely psychological (Moleski 1978). The degree to which each need has to be fulfilled varies from person to person, depending on the individual's philosophy of life, personality, culture, and habituation level—what they are used to. Not everybody seeks a large measure of bodily comfort; some people stress aesthetic needs over physiological ones. Some are prepared to give their lives for what they believe. People do, however, look at the environment partly in terms of their needs; what they discern is largely based on their needs and on what they have learned to perceive.

PERCEPTION

Perception is the process of obtaining information from and about one's surroundings. It is active and purposeful. It is where cognition and reality meet (Neisser 1977). There have been several major

attempts to describe and explain why we perceive what we do. They have influenced environmental design theory very much, particularly by their efforts to develop aesthetic philosophies. Designers have not always realized how conjectural these theories of perception are. The result has been that they have drawn very strong conclusions about the purposes of design based on very inadequate evidence.

There are two basic sets of theories of perception. One focuses on the reception of sensory experience and the other on the senses as active and interrelated systems. The first set attempts to explain how sense data, the supposed units of perception, get put together in the brain. *Empiricism* (Titchner 1910, Helmholtz 1925, Carr 1935) suggests by association. *Transactionalism* (Ames 1960, Ittelson and Cantrel 1954), which influenced the writings on environmental design of people such as Walter Gropius (1947), Lewis Mumford (1952), and Clifford Moller (1968), stresses the role of experience. *Nativist and Rationalist* theories (see Cassirer 1954, Piaget 1955, Chomsky 1957) stress the role of innate ideas and the making of rational inferences from sensations. Christian Norberg-Schulz's discourse on design (1964) is very much influenced by this theoretical approach to perception. *Gestalt* theory argues that the basis for the integration is the spontaneous organization of sensory inputs to the brain (Köhler 1929, Koffka 1935, Wertheimer 1938, Ellis 1939), whereas *information-processing* theories suggest that there are computerlike processes in the brain. Gestalt theory has influenced design theory (see Kepes 1944, Ushenko 1953, de Sausmarez 1964, Isaac 1971, Arnheim 1977) more than any other perception theory, whereas information-processing theories are the basis for the writings on aesthetics of people such as Abraham Moles (1966).

In contrast to these theories is the *ecological approach* of James Gibson (1966, 1979) and Eleanor Gibson (1969), who suggest that perception is information based. This should not be confused with the information-processing cybernetic models of perception. The Gibsons acknowledge the reality of sensory experience but regard it as a by-product rather than the "building blocks of perception." Ulrich Neisser (1977) added the concept of *schema* as a "connecting link between perception and the higher mental processes" to the basic theory.

While Gestalt theory has most influenced the ideas of environmental designers during the course of this century, it has been seriously challenged as an explanation of how the world is perceived by transactionalist and ecological theories in recent times. It is important to understand these three interpretations of the processes of perception, because they have influenced and will continue to influence our thinking about the nature of environmental design at all scales.

The Gestalt Theory of Perception

The Bauhaus formulation of basic design was considered to be factual because it drew so heavily on, and/or was so heavily corroborated by, Gestalt theory. Artists such as Kandinsky (Overy 1969) and Kepes (1944) must have been attracted by Gestalt theory's emphasis on pattern perception. The speculative nature of much of Gestalt theory was, however, not clearly recognized. To understand Gestalt theory, its attraction for artists and architects, and what it still affords us in creating positive environmental design theory, one must understand its concepts of *form, isomorphism,* and *field forces.*

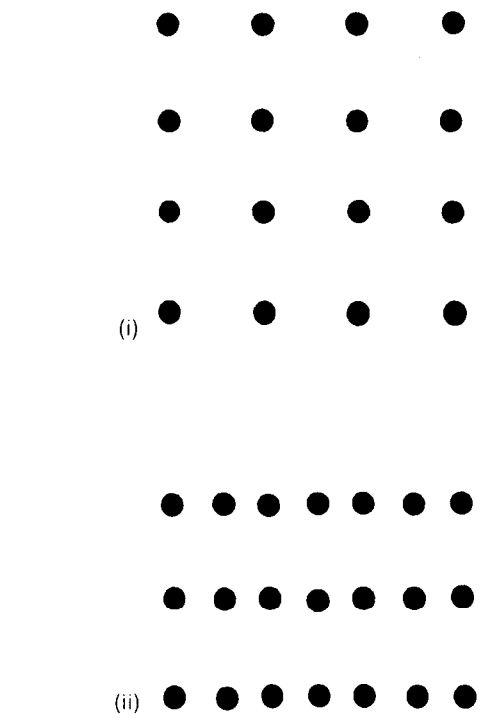
Form is fundamental. It is that which stands apart as a closed and structured element in the visual world (Katz 1950). "The *solid figure* appears as something apart, behind which the *ground* seems to extend without interruption like a homogeneous plane" (Köhler 1929). Gestalt psychologists compiled a list of factors that influence the perception of form. Seven of these are of importance to environmental design theory because they tell us much about how units in the environment are perceived. They are the "laws" of *proximity, similarity, closure, good continuance, closedness, area,* and *symmetry.*

Proximity is the simplest condition of organization (Hochberg 1964). According to Gestalt theory, objects that are close together tend to be grouped together visually, the relative closeness offering the least resistance to the interconnection of sensory units. This law is illustrated in figure 9-2a. The rows and columns are seen with equal ease in (i), but in (ii) the pattern is perceived as a set of rows.

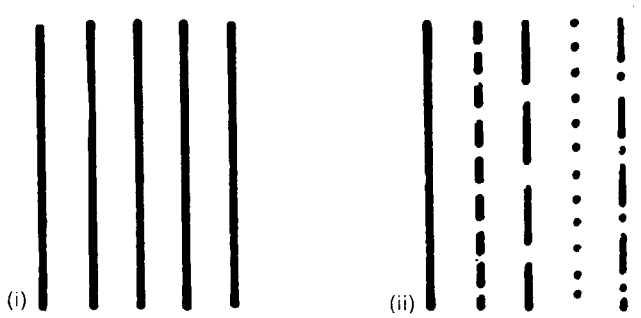
Proximity can yield to other factors of organization. Figure 9-2b illustrates the law of similarity. If elements have similar qualities—size, texture, color, and so forth—they tend to be perceived as single units, as in (i) rather than in (ii). In figure 9-2c a conflicting situation is shown. Here it is possible to impose an organization based on similarity or proximity. Artists describe this state as one of tension.

The law of closure states that optical units tend to be shaped into closed wholes (Köhler 1929). In figure 9-2d two such cases are illustrated. The pattern in diagram (i) tends to be seen as a completed circle and (ii) as a triangle. The openings in the figures seem insignificant or extremely important, depending on one's focus.

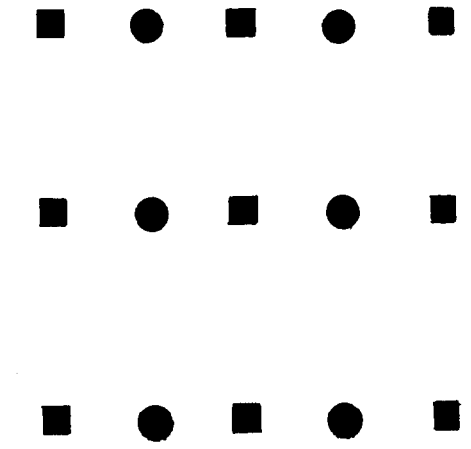
The law of good continuance states that people



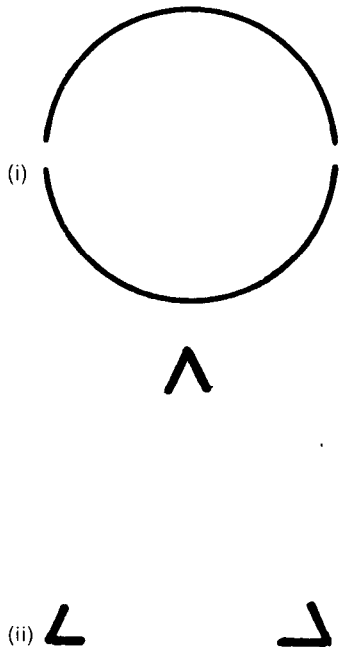
a. Law of Proximity



b. Law of Similarity



c. A Conflict between Laws of Proximity and Similarity

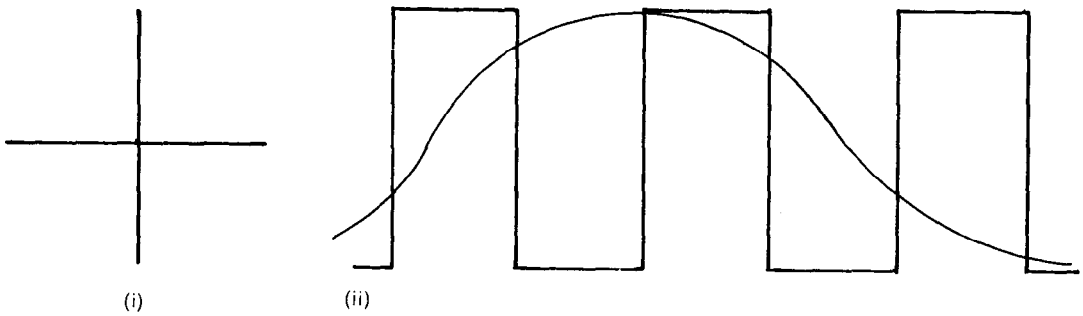


d. Law of Closure

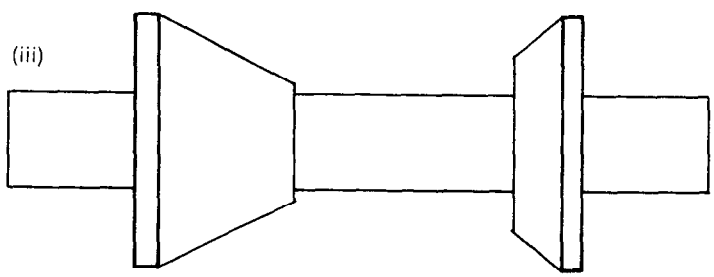
9-2. The Gestalt Laws of Visual Organization.

tend to perceive continuous elements as single units. In figure 9-2e we perceive (i) as two lines crossing and not as two L's. We perceive (ii) as a sine wave on a castellated background, although the law of closedness suggests that we should see it as a set of closed forms. We see (iii) as a two-dimensional representation of a surface extending behind two others.

The other laws of organization are not so fundamental. The law of area states that the smaller a closed area the more it tends to be seen as a figure. The law of symmetry states that the more symmetrical a closed area the more it tends to be seen as a figure. The law of closedness suggests that areas with closed contours tend to be seen as units more generally than those without them. Thus in 9-2f (i) the shape with a closed contour tends to be seen as a unit; we tend to see the frame in (ii) and the window in (iii), while in 9-2g the shaded area appears to be seen as a column on a white background.

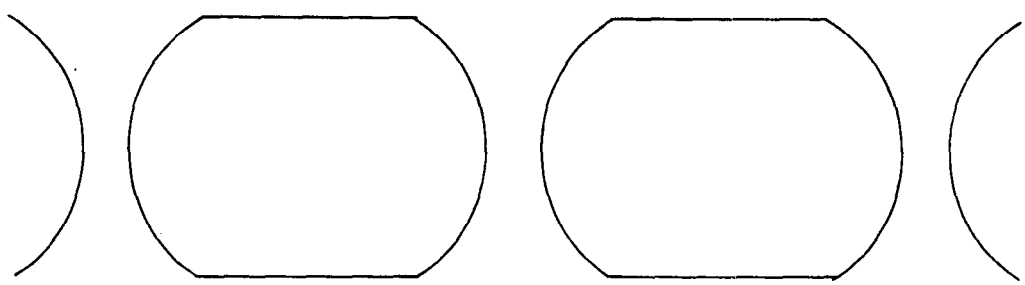


(i) (ii)

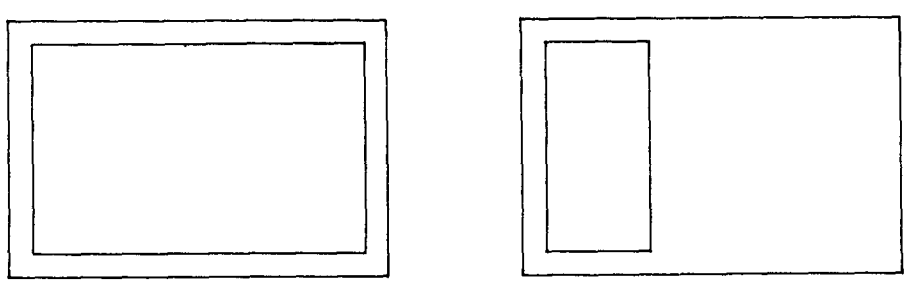


(iii)

e. Law of Good Continuance

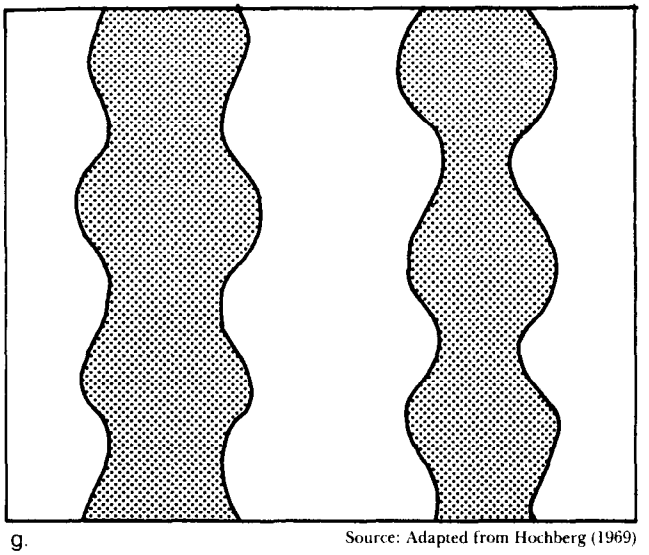


(i)



f. (ii)

9-2, *continued.*



g. Source: Adapted from Hochberg (1969)

9-2, *continued.*

All of these laws are explained in terms of *isomorphism,* an hypothesized parallelism between the form of underlying neurological processes and the form of the perceptual experience (Köhler 1929). Rudolf Arnheim (1965) notes:

> The forces which are experienced when looking at visual objects can be considered the psychological equivalent of physiological forces active in the brain center of vision. Although these processes occur physiologically in the brain, they are properties of the perceived objects themselves.

All these forces are said to occur in some field or environment. *Field forces,* as in mathematics, are said to have an area of application, a direction, and a magnitude. The state of the field is the result of all the forces acting there (Koffka 1935). All these forces are governed by the principle of *Pragnanz.* According to this principle, perceptions take the most stable form under the circumstances.

In summary, Gestalt theory suggests that all our perceptions are organized into figures—this book is a figure with the surroundings as ground. In addition, patterns of lines, planes, and objects appear to have certain "dynamic" qualities—they appear to move, or to be heavy or light, happy or sad. This is explained by the isomorphism between perceptual experience and human neurological processes. This is the basis for the Gestalt theory of expression in art and architecture (Arnheim 1949, 1968, 1977, Levi 1974). According to Gestalt theory these are not subjective associations with visual patterns. They precede the perception of pattern. Arnheim (1968) writes:

> The theory would seem to explain why in actual experience the dynamic or expressive aspects are the most powerful and immediate qualities of the percept.

This is a controversial observation, but it is implicit and often explicit in much Cubist art and in modern architectural ideology—normative theory.

The concept of isomorphism has been severely challenged in recent times. R. L. Gregory (1966) notes:

> There is no independent evidence for such brain processes and no independent way of discovering their properties. If there is no way of discovering their properties then they are highly suspect.

There is much experimental evidence that supports this contention (such as Lashley, Chow, and Semmes 1951). The introspective analyses of design theorists have led also to a doubt that it exists (Colquhoun 1967). Recent theories of perception suggest it is unnecessary (Gibson 1966, 1979). Findings can be explained in terms of learned associations of patterns with feelings.

The legacy of Gestalt theory is a major one both in psychology (Gibson 1971) and in environmental design. Its empirical observations of the ways in which we order the environment still offer much for environmental design where formal aesthetic issues of unity often arise. It forms the basis from which the ecological approach to perception is derived (Gibson 1950). At the same time many questions about the processes of perception have been more thoroughly addressed by more recent theories.

The Transactional Theory of Perception

Transactional theory emphasizes the role of experience in perception and focuses on the dynamic relationship between person and environment. Perception is considered to be a *transaction* in which the environment, the observer, and the perception are mutually dependent on each other. William Ittelson (1960) defines the process as follows:

> Perception is that part of the living process by which each of us, from his own particular point of view, *creates* for himself the world in which . . . he tries to gain his satisfaction.

The intellectual underpinnings for this position are in transactional philosophy (Dewey and Bentley 1949), the psychology of Adelbert Ames (1960), and the sociology of George Mead (1903). Transactional theory makes a number of assumptions about the