

THE MORPHOLOGICAL STUDY OF THE CITY;
AN ANALYSIS OF THE PERCEPTUAL DEVICES;

Preamble

In a study of the form of the city, two complex variable processes are noted:
a) the human being and b) his environment.

a) i. The human being as an individual has an infinite response to the world around him. He is physically mobile and possesses eyes which are in continuous scanning. His body position changes from static to one of movement, both natural as well as artificial movements of automobile and airplane. The equipment of one human differs from the others as do his needs. We think here in terms of the individual resonating towards his environment.

ii. The individual is also a member of a group which is in constant change, undergoing a transforming process with different values, symbols, knowledge and understanding. This complex process includes the individual resonating toward the group as well as the group resonating to the environment.

b) The environment itself is not a stable form optically and is a continual process of physical transformation. It changes in terms of signals transmitted to the human eye with changing light values and it changes as the mobility of the individual changes. The environment, both the so-called natural and man-made constantly undergoes a growth change, a process of interaction of nature upon nature, nature upon man-made environment and man-made environment upon man-made environment.

Perception

This aspect of the study deals with one of the means by which the individual, a), relates himself to the environment, b). Perception is a tool used by man to find for himself out of an otherwise chaotic array of forms, spaces, impacts and values, a meaningful structure within which he can coherently exist. In this study we are concerned mainly with visual perception, as it plays quite the largest role in the human being's relation process.

Visual perception involves an active exploration of the surrounding world, and not merely its mechanical reading, as had been supposed by many previously. It requires of the individual to organize out of the myriads of light values that impinge on his retina, a coherence of planes, surfaces and spaces, which he then recognizes and understands as familiar objects. It allows him to perceive of objects in a spatial world, x related to each other and to the perceiver in meaningful association. From the immediate sensory data he can build up for himself a hierarchy of groups of perceived elements, always with the purpose of defining his position in a visual world. As he moves in time, through this world, the unconscious structuring is related to the new perceived phenomena. The stimuli are compared, manipulated and resolved within the hierarchy, all with the purpose of coherence and understanding necessary for the successful survival of the individual.

Let us take a closer look at the processes of visual perception and the perceptual devices evident in the visual world.

Everybody is familiar with the physical processes of vision. For vision to occur the eyes must be open, there must be light, the eyes must focus and point, the sensitive film at the rear of each eyeball must react to light and the optic nerve must transmit impulses to the brain. However this simple process does not explain the perception of space and its concomitant problems. These problems of form and shape in a three-dimensional world, motion and constancy of shape, figure as distinguished from ground, spatial relationships, color and light and others, are the essential features of a perceived concrete sensory world.

The history of the study of visual perception is ridden with theories, counter-theories, semantic distinctions, e.g. "nativism and empiricism", and it is not intended to discuss these here. With the work of the Gestalt psychologists a major step was taken forward in the explanation of many of the perceptual phenomena but it seems that in their presumptions regarding space perception they were less explicit than in their thoughts on form perception. Today criticism is being levelled at some aspects of their work and one wonders whether this is relevant here. It is true, however, that if everything of which the individual is aware, comes through stimulation of his sense organs and if some things of which he is aware have no counterpart in direct stimulation, it is necessary to assume that the latter are somehow synthesized. How this synthesis occurs remains the problem of perception.

In this problem, certain cues exist in the physical visual world which are accepted as the devices by which the individual relates himself in space. Many conflicts exist between contemporary investigators as to the exact correlation between the object and its perception and this is not of great significance here. It is, however, possible from their work to compile a list of perceptual devices available to the perceiver. These can be accepted for their worth in this project and by application either found to be of use or not.

THE Visual Devices

A. With Reference to Distance over a Surface or Surfaces.

1. Devices dependent upon the position of the observer.

a) Texture perspective:

This is a gradual increase or decrease in the density of the fine structure, gaps, spots etc. or extended pattern in the visual field.

b) Size perspective:

This is closely bound up with the previous and concerns a decrease in size of the shapes and figures in the visual field when it is considered as an array of color patches.

c) Linear perspective:

This is size perspective taken one step further when contours are rectilinear. Since the edges of things in the man-made world are so often rectilinear, this has become a very active device.

perspectives
of position

perspectives
of
parallax

d) Binocular perspective:

This is the device occurring in the visual field when double-images exist and is impossible to notice except at contours. It changes from a maximum of crossed double imagery toward uncrossed double imagery and is a result of the fact that the individual possesses two eyes.

e) Motion perspective:

This is the gradual change in the rate of displacement of texture elements or contours in the visual field. It changes from motion in one direction through zero to motion in the opposite direction.

2. Devices independent of the motion or position of the observer.

f) Aerial perspective:

This is an increase in the haziness, blueness or desaturation in the visual field. It is probably an indicator of distance rather than a stimulus.

g) Blur perspective:

This is a decrease toward the center of clear vision of the quality of blur. The impression of distance may be caused by the fact that the object focussed upon is in focus while the further objects possess degrees of blur.

h) Relative upward location in the visual field:

This device might occur more readily for objects represented in pictures but could occur when the background is a terrain and not a wall or ceiling, which seems to prove that in outdoor perception, the floor surface produces the most effective stimulus differences.

B. Depth - at - a - Contour.

The devices in this group deal with the effect of depth or distance which exists when there is a sudden difference between areas of color in the field.

i) Shift of texture density or linear spacing.

This is a change in the density of texture or spacing which is sudden and not gradual. It is usually coincident with a change in brightness or color in the visual field such as to produce a contour.

j) Shift in amount of Double Imagery:

This occurs at a contour when the texture-elements on one side of the contour occur less doubled than those on the other side. The contour itself may be seen in single imagery but the observer may see that side as more distant which manifests a relative shift toward uncrossed double imagery.

k) Shift in the rate of motion.

This occurs during the movement of the observer's head and consists of more rapid displacement of texture-elements on one side of a contour than on the other.

C. Other Devices Related to Depth-at-a-Contour.

- 1) Completeness or continuity of outline:
Associated with the previous devices at a contour, it can be assumed that if objects tend to have regular outlines, completeness, closure or continuity tends to be associated with the near side of a common contour and incompleteness with the far side. A contour exists between the two objects and the side belonging to the completed outline usually has the coarser texture, the greater relative motion and the greater crossed disparity.
- m) Transitions between light and shade:
Also associated with the depth-at-a-contour phenomenon, an abrupt shift in the brightness of adjacent regions within the visual field produces a contour, which is the necessary condition for a segregated shape or form.

D. Other Devices

- n) Kinesthetic sensations produced by divergent and convergent eye movements.

This device is merely accurate up to a distance of six feet and is seldom a factor in the environmentology of the city.

- o) Kinesthetic sensations of accommodatory eye movements.

Again, this device is applicable only to close distances.

An Application

These then are the perceptual devices which are known to exist and operate in certain conditions of space or at one condition of time. In relation to the study of the morphological aspect of the city, how many of these exist dynamically; how can they be shown to exist; what role do they play in the structuring of space and finally to what extent can they be harnessed into use by design processes based upon an understanding of these devices; all these are to be studied and presented. Most of this can best be shown by means of a case-book which follows and the final design steps are the last stage.

With this understanding of some of the ways in which man relates himself to his multi-dimensional environment, we can learn to some degree how he creates for himself a space structuring and to what extent we can create a surrounding environmentology which will allow him the maximum possibility of perceiving the city as a whole.