<u>The Image of the City</u>

As a preliminary outline of our ideas on the subject of "visibility", or orientation, in cities, the following discussion should help in directing our analysis. Statements are either guiding assumptions or are propositions which remain to be tested. We expect that many revisions will occur before we are done.

Our study has principally to do with the individual's <u>schema</u> of his city, his generalized image of the urban environment; and of the relation of this schema to the physical environment itself. This generalized mental picture is abstract, independent of the immediate present or the actual presence of the object imaged, although it may also operate in the act of perceiving the object. It is a device used by the individual to cope with the overwhelming richness of the outside world.

THE SCHEMA

The schema is a purposive simplification of reality, and as such it must be tested, not in terms of accurate reproduction, but for its functional value. Six criteria for schemata may be listed:

1.) The schema must be <u>sufficient,</u> or "true" in the pragmatic sense. That it must allow the individual to move about satisfactorily, or otherwise to operate within the city, to the extent desired.

2.) It must, by means of its simplicity and clarity be <u>economical</u> of perceptual, emotional and intellectual effort.

3.) It must be <u>safe,</u> with sufficient redundancy of clues and margin of error that the danger of failure is not higher than desired.

4.) It should be <u>communicable</u>, if there is any need to transmit the image to others or to rely on common symbolic agreements.

5.) It should be <u>integrated</u>; harmonious, that is, with the total emotional and intellectual system of the personality.

6.) It should be <u>supple</u>, allowing choice by providing alternate paths and destinations; forming a good springboard for exploration and further organization of reality, adaptable to exterior changes.

The relative importance of these criteria will very with different persons in different situations, so that one will prize a safe and sufficient closed system, another a supple and communicable one. But with this qualification, it now becomes possible to compare various schemata, and to rank them on some rough qualitative scale of value.

IDENTITY STRUCTURE AND MEANING

There seem to be three components in the make-up of an environmental

image: <u>identity</u>, <u>structure</u>, and <u>meaning</u>. These are constantly intermingled in varying proportions, but may be usefully abstracted for analysis. Thus a schema requires first the identification of an object, which implies its distinction from other things, its recognition as a distinguishable entity; secondly that this object be somehow related to the observer and to other objects in the schema; and thirdly that this object have some meaning for the observer, practical or emotional. Thus a schema useful for making an exit requires the recognition of a door as a distinct entity, its spatial relation with the observer, and its meaning as a hole for getting out.

Those are not truly separable. The visual recognition of a door is matted together with its meaning as a door. But it is possible and useful to analyze the door in terms of its distinctiveness or identity of form, considered as if it were prior to its meaning. Particularly when considering the complexity of a city, this is a necessary first step of analysis. This study, therefore, will wherever possible concentrate on the two components of <u>identity</u> and <u>structure</u>, to the exclusion of meaning.

It should be noted that the perception of structure of identity may arise in several ways. There may be little in the real object that is remarkable, yet it has gained identity and organization through long familiarity. At the other end of the scale, an object seen for the first time may have strong structure or identity solely because of vivid and striking physical features, which impose their pattern upon the observer.

Contrariwise, an object seen for the first time may be identified or related neither through familiarity nor physical vividness, but because it conforms to a stereotype already constructed by the observer.

ENVIRONMENTAL VISIBILITY

Those schemata, or 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 tested against the filtered perceptual input, in a constant interacting process. Thus the image of a given reality may vary significantly between different observers.

Despite this variation, the form of physical reality is still a fundamental element in the process, and as manipulators of the physical environment we are primarily interested in this pole of the interaction. We may say that a given physical form has a high or a low probability of evoking a high value image in the minds of a large number of observers. Presumably this probability can be stated with greater and greater precision as the observers are grouped in more and more homogeneous classes of age, sex, culture, occupation, temperament, familiarity, etc.

Men can, if necessary, learn to relate and distinguish even seemingly "featureless" environments, such as snow fields or trackless oceans. But these environments can resist or facilitate this process, and thus the observer requires more of less effort, and derives less or more

satisfaction from it.

We propose to concentrate on the environment as the variable and we now define <u>visibility</u> as being that quality in a physical object which gives it a high probability of evoking a high value image in any given observer. It is therefore, a new and arbitrary meaning of the word, being that shape, color, arrangement, etc. which facilitates the making of vividly-identified, powerfully-structured, highly useful mental images of the environment.

To elaborate more loosely, a highly "visible" city in this peculiar sense would seem well-formed, distinct, remarkable; it would presumably invite the eye and the ear to greater attention and participation; the sensuous grasp upon such surroundings would not merely be simplified, but also extended and deepened. It would follow from the criteria for images that such a city would be one that could be apprehended, over time, as a pattern of high continuity, with many distinctive parts thickly and clearly interconnected, and with a pattern in structural correspondence with the meaning of that environment both functional and symbolic. Here the perceptive and familiar observer could absorb new sensuous impacts without disruption to his basic image, and each new impact would touch upon many previous elements. He would be well oriented, and could move about easily. He would be highly aware of his environment, and induced to explore it sensuously.

Out present cities, with their structural chaos and lack of differentiated form, seem to display the very antithesis of this quality.

It may be helpful to define the term a little farther, by exclusion. "Visible" is not here meant as being restricted to sight alone, but it figuratively extended to the senses of smell, sound, touch, kinesthesia. It does not mean apparent in a single glance, since city perception is by its nature spread over long time-spans. It does not include the qualities of meaning or expressiveness, as discussed above. It does not necessarily connote something fixed, limited, precise, exact, unified or regularly ordered, although it may sometimes have these qualities. It is not meant to equate with obvious, patent or plain. The total environment to be patterned is highly complex, while the obvious is soon boring and can point to only a few features of the living world.

VALUES AND DIS-VALUES OF VISIBILITY

What might be the value of possessing a visible environment? Several may be noted:

1.)   It facilitates the solving of practical problems of localization and movement.

2.)   It gives the inhabitant a sense of security, familiarity and stability; which is important to his emotional balance.

3.)   It provides a spatial and symbolic frame of reference within which an individual can act; a base on which he can pin his knowledge of the world; a springboard for its exploration and discovery.

4.)   It furnishes the raw material for collective memories and common symbols; promoting group cohesion and communication. (See "La Memoire Collective")

5.)   It heightens the intensity of human experience, by pro-

viding a world that is vivid and poetic.

The relationships between these values of a visible world, and the criteria for schemata set forth above should be plain.

It can also be admitted that there is some pleasure in finding mystification, disorientation, labyrinth, or surprise in the environment. But only under two conditions:

a.   There must be no danger of losing basic form or orientation, of "never coming out". The surprise must occur in an over-all framework; the confusions must be small regions in a visible whole.

b.   The labyrinth of mystery must in itself have some form that can be explored or apprehended. True chaos is never a pleasure.

Beyond this minor point, however, certain basic theoretical disadvantages in a highly visible landscape or a highly developed environmental image can be pointed out:

1.)   It may hinder practical activity if taboos, or excessive and rigid channelling have developed. Exploitation is difficult if one is sentimental about the land.

2.)   By the creation of a highly specialized and intricate system of images, sensuously vivid and lacking in generality, intergroup communication may be hampered.

3.)   More seriously perhaps, the possibilities for the creation of new groupings, new symbols, or new understanding may be smothered by an overly-developed system.

It remains a problem to develop high visibility in the environment,

and yet to retain enough flexibility and room for growth to avoid these difficulties. A visible form is necessary which is open-ended to the development of new schemata and to changes of technology, culture, etc.

COMMON FEATURES OF CITY SCHEMATA

The schema itself is not a precise miniaturized model of reality, reduced in scale and consistently abstracted. As a purposive simplification, it is made by reducing, eliminating or even adding elements to reality, by fusion and distortion, by relating and structuring the parts. It is sufficient, perhaps better, for its purpose if rearranged, distorted, "illogical". A five-sided rectangle, for example may be quite possible. They are non-Euclidean, fluid, time-saturated.

In general, it will be found that, however distorted, there is a strong element of topological invariance with respect to reality. It is as if the "map" were drawn on an infinitely flexible rubber sheet: directions twisted, distances stretched or compressed, large forms so changed from their accurate scale projection as to be at first unrecognizable. But the sequence is usually correct, the map is rarely torn and sown back together in another order. This is obviously necessary if the image is to be of any value.

Another common feature is the enlargement of known, meaningful or important areas, and the dimunition of the rest. The schema has a built-in rending glass. Still another characteristic is that the image will shift and deform while in use.

SETS OF IMAGES

Nor is there simply a single comprehensive image for the entire environment. Rather there are sets of images, which more or less overlap and interrelate. The schemata are typically arranged in a series of levels, roughly by the scale of area involved, so that the observer moves as necessary from an image at street level, to a neighborhood area, to a complex, to a city, to a metropolitan region, national region, continent, and so on. We are operating only upon a selected set of these levels, roughly from the scale of a street or a group of buildings up to the large city (but not yet metropolitan) area. It would be interesting to apply the same ideas to the organization of a valley region for example, or to a house.

The components of a structure and identity (which are the parts of the image in which we are interested) seem to leapfrog as the observer moves up from level to level. Thus the identity of a window may be structured into a pattern of windows which is the cue for the identification of a building. The buildings themselves are interrelated to form an identifiable space, and so on.

This arrangement by levels is a necessity due to the complexity and range of scale in the environment. Yet it imposes an extra burden of organization upon the observer, especially if there is a little relation between levels. Thus if a tall building is unmistakable in the total city panorama, yet unrecognizable and difficult to localize at its base, (which seems to be the case of the John Hancock building), then a valuable chance has been lost to pin together the image at two different

levels of organization. The State House on Beacon Hill on the other hand, seems to pierce and take a recognizable place in several image levels. It holds a strategic place in many observer's organization of the center.

Images may also separate not only by scale of object, but by such factors as the manner of viewing, or time of day or season. Here again it is critical that the Faneuil-Market-as-seen-in-its-midst image, be also recognizable and related to its image in the experience of driving the Central Artery. Or that Washington Street-by-night have some continuity, some element of invariance, with Washington-by-day. In order to accomplish this in the face of sensuous confusion, many observers find it necessary to drain their images of sensuous content, and use such abstractions as "restaurant" or "second street", which operate both by day and night, driving or walking, albeit if with some strain or lack of poetry.

THE SCHEMA AS A FIELD SYSTEM

There are indications that the schema, or set of schemata, for any one person is a total field, continuously interrelated, where the disturbance of one element in some way affects every other element. One major distortion such as a twisting of the shape of the Common, is often reflected systematically throughout the entire image of Boston at the city level. The disturbance of large-scale construction work affects more than its immediate environs. We are at present largely unable to study such field effects, except to note striking instances of widespread disturbances due to change, or to illustrate simple effects of context upon perception of a city element. But while this study is now limited

to single elements or pairs of element interactions, eventually investigation should move toward a general field theory.

Later it would also be interesting to learn how the schema adjusts to external physical change, as in the constant rebuilding of our cities. When does the image become modified, and within what limit, can it do so? When is reality ignored or distorted to preserve the image? When does the schema simply break down, and at what cost? How can it be successfully rebuilt?

THE PUBLIC IMAGE

In the last analysis, each individual creates and bears his own peculiar image, but there are substantial agreements between individuals of the same class, temperament, occupation, location of residence. It is these group schemata, exhibiting consensus among significant numbers, that interest us a planners, who aspire to model an environment which will be used by many people. Thus the study will tend to pass over individual differences, interesting as they might be to a psychologist.

Indeed, search will first be made for what might be called the public schema, the image of the city which is carried by the great majority of its inhabitants, an area of agreement which might be expected to appear in the interaction of a single physical reality, a common culture, and a basic general physiological nature. There is some hint from our study to date that a public schema of some scope may indeed exist, although the sample is too small to be reassuring. If such an image proves fragmentary or non-existent, then search would be made for group schemata car-

ried by significant fractions of the population, each large enough to justify consideration in city design.

ENVIRONMENTAL IMAGE AMONG ANIMALS AND MEN

The vital nature of the structuring and identifying of the environment is notable even among animals, and one biologist has best impelled to say: "The cardinal function of visual systems is the regulation of motion, and visual sense organs are primarily concerned with spatial orientation … sense organs of vision develop only in animals capable of motion". Although color, shape, motion and even polarization of light may be primary orientation cues for most animals, yet many other sensations are used: smell, sound, touch, kinesthesia, sense of gravity, perhaps Coriolis force and magnetic field. These techniques of orientation, from the fight of a tern from pole to pole, to the path-finding of a limpet over the micro-topography of a rock, are described and their importance underscored in an extensive literature.

Despite a few remaining puzzles, it now seems unlikely that there is any mystic "instinct" of way-finding. Rather is there a consistent use and organization of definite sensory cues from the exterior environment. This organization is fundamental to the efficient and very survival of many forms of free-moving life.

Experimental psychologists have also studied this ability in man, if rather sketchily and under limited laboratory conditions. The importance of a coherent image of the environment, both for practical orientation reasons and also for the very emotional survival of the individual, has

been clearly shown. (References). Another paper, previously prepared, discussed the role of the environmental image among primitive peoples, and furnishes an interesting background for this study.

It would be equally instructive to trace the importance of this quality today, and to some extent our studies have attempted to do that. A good source lies in the descriptions of cities in literature, where the phenomenon is under the eye of a trained observer. (Quote Proust and Gill).

THE URBAN ELEMENTS OF VISIBLE FORM

There would seem to be five general classes of urban features which are commonly used to identify and structure the environment at the city scale. They may be called: paths, edges, nodes, landmarks and regions. Springing originally from an intuitive classification, this list has been substantially reorganized and confirmed by current studies. Discussions as to their characteristics, which occur below, as yet are, however supported only fragmentarily by these investigations.

PATHS

Paths are the channels along which the observer moves or is accustomed to move. For many people, this is the predominant element in their schema of the city, which they sense as a whole in the process of moving through it. Along these paths (which may be streets, walkways, transit routes, canals, etc.) are arranged and related the subordinate elements of the environment, and the paths contain the information of "how to get to" those other points.

Paths may be <u>single</u>, as is the organizing line of the Venetian Grand Canal. These lines are strengthened by habitual travel; by the traffic flows channeled within them; from intensity of use or characteristic activity; from physical continuities of space facade, floor or detail.

More than one line may be <u>structured</u> in simple forms, as the cardo and decumanus of Market and Broad in Philadelphia. The number involved must not be too great (3, 4, 5?) and the connections must be clear and definite. Our habituation to the right angle is to be notes, as well as the orientation problems of intersections of small angle or of more than four entering paths. Topological simplicity of form is the key to good structure, however, and not geometrical purity, since the observer readily generalizes such relations. A is a more powerful reference system than B:

A. [illustration]   B. [illustration]

Again, paths too numerous to keep in mind as specific entities may be retained as a <u>network</u>, a set of regular relationships. They may be ordered in terms of their:

directional consistency   [illustration]

regularity of intersection   [illustration]
(topological order)

or regular interspacing, or any combination.

These networks have an obvious significance to relate large areas, but may lack sensuous power if divorced from more tangible reference devices.

Paths may be more or less progressive, that is, differentiate one direction along the line from another. This sense arises from some sequence of events along the line, from a gradient, from the importance of origin or destination, from directed character in the traffic, or from differentiation of the two sides of the channel. Further than this, they may be directional, having a consistent direction which is referable to a larger system. Absolute straightness is not necessary, and a few clear changes of direction may be retained, but a gradual turning can be ambiguous and confusing. Finally, the path bay be scaled, able to confer a sense of position along its length, or a sense of the distance traversed. This may come from a pattered sequence of points; from modulations of direction, space, form or use; from gradients producing observable differences. There is a sense of "halfway" or "soon". Such "melodic" form observed in motion, also strengthens the unity of the line.

EDGES

Edges are the linear elements not used or considered as paths by the observer, which are the boundaries between two phases, linear breaks in continuity: such as shores, railroads, edges of developments, walls, etc. They are lateral references rather than coordinate axes. Such edges may either be of the nature of barriers, more or less penetrable, which close one region off from another; or they may be seams, lines along which two regions are related and joined together, which is the

significance of the edge of Beacon Hill at the Commons. These edge elements, although probably not as dominant as paths, are for many people important organizing features, particularly in the role of holding together generalized areas, as in the outline of a city by water or wall.

Like paths, edges are strengthened by continuities of physical form, as well as by size, spatial prominence, impenetrability, and the ability to get a broad transverse view of them. They may also have progressive, scaled and directional qualities, but more often the reference conferred is "along", "toward", or "inside-outside". It should be noted that a path in one situation, as an elevated expressway, may in another be an edge, as for the pedestrian on the city floor below. Edges as strong barriers may in some situations become disorganizing features in the landscape.

REGIONS

Regions are the medium to large sections of the city which are conceived of as having some two-dimensional extent which the observer mentally enters "inside of", and which are recognizable as having some common, identifying character. Always identifiable from the inside, they are also used for exterior reference where visible or sensible. Most people structure their city to some extent by this classing, with individual differences as to whether paths or regions are the dominant elements. This seems to depend not only upon the individual, but also upon the given city, Boston being particularly rich in such regions.

Boundaries of regions (which are themselves types of edge-reference, of course) may be <u>hard</u> or <u>soft</u>, or even non-existent. In the latter case, the region has only a characteristic focal area and an indefinite gradient outward. Here there is no clear sense of "now I am outside". The region itself may be <u>unstructured</u>, being simple homogeneous and recognizable, without any clues as to location inside the area; or it may be <u>structured</u>, which an internal patter of paths, regions, nodes, etc.

Regions divide into two general classes: districts and spaces. The former are the rather large areas, rarely visible from one standpoint, whose character is set by continuities rather than by clear form. Greenwich Village in New York, the North End in Boston, the Loop in Chicago, are all examples of this group. They are formed by similarities of texture, space, forms, detail, symbols, building type, use, water, vegetation, topography, even sounds or smells. Such physical similarities are usually clustered in a typical association, or <u>thematic unit</u>, for any given district. A singular use or status area, a hill or a section of distinct history will often have this character of a region. They are also formed by external discontinuities (edges), and by external contrasts, as the village which is unified by contrast to the mountain behind it. Alternatively, a strong space or node may radiate its influence for some distance, so that a district is formed by association (as the Central Square area, Cambridge), which may be viable despite its lack of internal homogeneity or external boundary.

Spaces are the regions conceived fundamentally as three-dimensional

voids; which are visible at the level of the visual world, or nearly so; and which have a coherent form. They are not only recognizable, but allow the observer to make definite locations within the space itself; i.e., they are always structured to some extent. In addition, certain spaces may be extrovert rather than introvert, giving clues to locations outside of themselves as well, due to directional qualities or space linkages. Spaces are made apparent by gradients of surface qualities (texture, light, and color); by sounds, patterns of motion, light and shadow, touch and kinesthetic experience; by visual transparencies, overlappings and perspective. To the degree that they have articulate form, they seem to be powerful and immediate recognition and structural features - at least as strong as the intense path. They are rather uncommon in American cities. In Boston, the Common, the Charles River Basin and perhaps Copley Square are (somewhat imperfect) examples of this class.

Both types of region may be isolated: single events set in a formless urban set. This is typical of most regions, both here and abroad. Much more powerful is the situation where two or more regions are linked together, furnishing an effective key to the structuring of large urban zones. This is found among districts in central areas, such as the linkage of Beacon Hill to the downtown shopping in Boston; and more rarely between spaces, except for European examples such as the Piazza Signoria - Arno River coupling in Florence or the succession of squares in Nancy. In a few cases, a richly endowed city may become a compact mosaic of such linked but independent spaces or districts. Central London might be cited as a district mosaic, parts of inner Rome as a space mosaic.

Finally, regions may be <u>continuous</u>, where there is no seam or joint as such, and a while urban sector becomes part of a single related region, although it may have internal structure at the next level down. In the case of districts, this means that an entire city, or large piece of it, takes on some harmony or similarity of form, as the color of Bologna. This effect may be a strong one, and can also be oppressive. No example of continuous spatial regions can be cited, except for simple big openings, such as River spaces. There are hints of more intricate but continuously formed sequences in Bath or Venice and perhaps a single-directional example in Peking. It may be stimulating to speculate what such a totally integrated space, which gave an impression of dynamic structure when traversed in many directions, could mean in a modern city.

NODES

Conceptually, the nodes are points, rather than lines, or areas; although they may in reality by large enough to include an entire central area, when the city is considered at a large enough level. These are the strategic "points" in a city into which an observer can enter, and which are the intensive foci to and from which he is traveling,

They may be primarily <u>hinge-points</u>, places of a break in transportation, crossing or convergence of paths, moments of shift from one structure to another. While not intrinsically important, those are the places at which attention and control much be heightened, and city travel is typically a progression from one to another of such hinge-points. Scollay Square in Boston is for many people an example of this type.

Secondly, nodes may be more particularly <u>cores</u> or centers, which gain their importance from being the most intensive focus of some use or characteristic, as, for example, the corner of Summer and Washington in Boston. They are the epitome of their region, over which their influence radiates and of which they stand as a symbol. The internal structure of regions is typically made up of paths and such cores, with the gradients that lead up to them.

Many nodes, of course, partake of the nature both of hinge-points and cores. It should be noted here that the concept of a node relates closely to both paths, since hinge-points are typically the convergence of paths, events on the journey, and also to regions, since cores are typically the intensive foci of regions, their polarizing center.

In any event, some model points are to be found in almost every schema, and in certain cases they may be the dominant feature. Most of the Boston "squares", which have little if any spatial quality, are more properly nodes. Like spaces, however, nodes may be <u>introvert</u> or self-sufficient, giving no directional quality to their environs other than from or towards themselves, and with no further sense on arrival than "here I am". Or thy may be <u>extrovert</u> having some outward orientation, even as points, so that approach to them seems to come from a certain side, and so that once within them the observer had clues as to how to go out to reach other points.

<u>LANDMARKS</u>

<u>Landmarks</u> are the other type of "point" reference, but in this case

the observer does not enter within them, they are always external references, and are usually some rather simply defined physical object (building, sign, store, mountain). Their use involves the singling out of one element from a host of possibilities. Indeed, the key physical characteristic of this class is singularity, some aspect that is unique or memorable in the context. They become more easily identifiable, more likely to be chosen as significant, if they have a clear form; if there is contrast and an articulate figure-background relationship (tower against the sky, flowers on a stone wall, church among stores); and if there is some prominence of spatial location. As in the case of all the urban elements discussed above, of course, these physical characteristics are very powerfully reinforced by associations or by names. Once a history or a status, a sign or a meaning, attaches to a building, its values as a landmark is strengthened.

Some landmarks are <u>distant</u> ones, typically seen from many angles and distances, over the tape of smaller elements, and used as radial references - whether they are within the city, or at such a distance therefrom that for all practical purpose they symbolize a constant direction. Such are isolated towers, golden domes, great hills. Even a mobile point, as the sun, whose motion is sufficiently regular, may be employed. While in theory strategic, they seem in fact to be used only occasionally by modern American observers.

Other landmarks are primarily <u>local</u> in nature, being visible only in restricted localities and from certain approaches. These are in-

numerable signs, store-fronts, trees, doorknobs, and other urban detail, which fill in the schema of most observers. These are very frequently used clues of identity and even of structure, which seem to be increasingly relied upon as a journey becomes more and more familiar. Landmarks are not always visual. They may be sounds whose point source can be localized, as a peanut whistle. Smells are harder for human observers to localize, but sometimes they are imaged as local events on a path, as the smell of beer from a tavern. Whether as singular points or as the raw material of sequences, these local landmarks take an important place in visibility.

Landmarks may be isolated, single events that is, without reinforcement. Except for large or very singular marks, these are weak references since they are easy to miss and require sustained searching. The tiny traffic light or single street name demands concentration to find. These points are sometimes clustered however, in which case they reinforce such other by repetition, as a position marked both by a florist's window, a scalloped sign, and a blue building. Such repetition makes recognition easier, and reduces anxiety. Landmark clusters may also give location by means of a crude triangulation process.

Marks may not only be related by simple clustering, but may also be arranged in a sequential series, so that the sight of one detail calls up the anticipation of the next, and the sight of the next confirms the former. Here again, the relationship facilitates recognition, and furthermore the landmarks can convey structure as well as identity. The observer's power to memorize details which are related is much greater and he can recognize a vast quantity of points experienced in a familiar sequence.

Recognition may break down when the sequence is reversed or scrambled.

Finally, landmarks may be <u>patterned</u> or have a relationship, instantaneous or having duration, which is of a higher level then clustering or an item-by-item series. In a natural setting, the signs of a gathering storm make on unmistakable pattern of detail which leads up to the climax of the event. Potentially, at least, a city observer might be given structural clues or recognition, not so much by particular points as by the pattern of change of point constellations, their thickening, thinning, etc. This category of landmarks is intuitional, and no clear urban example can be cited. Presumably, it could furnish a more vivid identity and a more precise structure, and may be of speculative interest.

<u>INTERRELATIONS OF ELEMENTS</u>

A given physical reality cannot always be irrevocably assigned to an element category, but may change occasionally with different circumstance of viewing on conception. Thus on expressway may be a path for the driver, an edge for the pedestrian. Or a central district may be a region when organizing the city on a medium scale, and a node when considering the entire metropolitan area. But the categories seem to have some stability when a given observer is operating at a given level.

It should be obvious that none of the element types isolated above, exist in isolation in the real case. Regions are structured with nodes, defined by edges, penetrated by paths, are sprinkled with landmarks. Elements regularity overlap and pierce one an other. In fact, the various

nodes, regions, paths, edges and landmarks seem in many schemata to build up into complexes, generalizations of a larger order which between them make up part of all of the total schema. Within each complex, the observer feels fairly confident of at least general identity and structure, and of the interrelationship of the included elements. Between complexes there may be flexible connections, positions relations, gaps filled with isolated elements, or sheer emptiness. Moving from complex to complex is accompanied by some uneasiness and uncertainty. Only rarely is the entire schema one interrelated complex, i.e., a total field. The Scollay Square hinge point is for most people, an example of a flexible, unstructured connection between two complexes.

The city as a whole, made up of these complexes and of more isolated elements, then has a structure and identity of its own, about which certain generalizations can be made: as to its strength or grain of structure critical points of confusion or cohesion, relative density of image, etc. These terms are as yet undeveloped.

FORM QUALITIES

Discussion of the basic elements has brought out some of the physical characteristics associated with high visibility. Certain of those characteristics or form qualities may be isolated which are the principal determinants in intensifying visibility. While originally intuitive assumptions, these qualities have been largely reshaped (though act thoroughly tested) by the investigations to date. They are, in effect, the categories of most direct interest in design, since they describe

qualities which may be operated upon in the design process. They may be outlined as follows:

       1.   <u>Continuity</u>: continuance of edge or surface (as in a strict channel, skyline or set-back); repetition of rhythmic interval (as a street-corner pattern); similarity, analogy or harmony of surface, form, or use (as in a common building material, repetitive bay windows, similarity of market activity, common signs, etc.) These are the qualities which facilitate the perception of a complex physical reality as one, or as interrelated; which suggest the bestowing of single identity up an area.

       2.   <u>Singularity</u> or figure-background clarity - sharpness of boundary (as an abrupt cessation of city development); closure (as an enclosed square); contrast of surface, form, intensity, complexity, size, use, spatial location (as a single tower, a rich decoration, a glaring sign). These are the qualities that par excellence <u>identify</u> an element, make it remarkable, noticeable, vivid, recognizable. Increasing familiarity seems to depend less and less on gross physical continuities to organize the whole, and to delight more and more on contrast and uniqueness to vivify the scene.

       3.   <u>Grouping</u> - nearness of parts one to the other, or hierarchical dominance of one part by size, intensity, interest, etc., resulting in the rending of the whole as a dominant part with an associated cluster (as in the "Harvard Square area", etc). A quality which allows the necessary simplification of the schema by omission and subsumption. Physical characteristics, to the extent they are over the threshold of attention at all, seem to radiate their image conceptually to some degree, filling-in actual gaps, or spreading out from a center.

4.   <u>Form Simplicity</u> - clarity and simplicity of visible form in a geometrical sense, limitation of parts (as the clarity of a grid system, a rectangle, a dome). Forms of this nature are much more easily incorporated in the schema and there is evidence that observers will distort complex facts to simple forms, even at some perceptive and practical cost. Note that when a form is not immediately visible (as in a street pattern), that topological distortions are quite allowable.

5.   <u>Clarity of Joints</u> - high visibility of joints and seams (as at a major intersection, or on a sea-front); clear relation and interconnection (as of a building to its site, or of a subway station to the street above). These joints are the strategic moments of structure and if they are clearly visible, a satisfactory whole can be constructed.

6.   <u>Directional Differentiation</u> - asymmetries, gradients, and radial references which differentiate one end from another (as on a path going <u>uphill</u> and <u>away from the sea</u> or <u>towards the center</u>), or one side from another (as with buildings fronting a park), or one compass direction from another (as by the sunlight, or by the width of north-south avenues). These qualities are heavily used in structuring on the larger scale.

7.   <u>Visual Scope</u> - qualities which increase the range and penetration of vision, either actually or symbolically: transparencies (as with glass or buildings on stilts); overlaps (as structures which appear behind others); vistas and panoramas which increase the depth of vision (as on axial streets, broad open spaces, high views); space articulating elements (foci, measuring rods, penetrating objects which visually explain

a space); concavity (as of a background hill or curving street) which expose farther objects to view; fore-warning clues which symbolically speak of a related element which is otherwise invisible (as the change in light which bespeaks a spatial change, the sight of activity or motion which is characteristics of a region to come, the use of signs or characteristic detail to hint at the proximity of another element). All these related qualities facilitate the grasping of a vast and complex while by increasing, as it were, the efficiency of vision; its ranges, penetration and resolving power.

        8.   <u>Motion Awareness</u> - clarity of channels, slopes, curves, interpenetrations; motion parallax and perspective; consistency of direction or direction change; visibility of distance interval; all of which make sensible, distinct and coherent to the observer, through both visual and kinesthetic senses, his own actual or potential motion (left-right, turning-straight, from-to, up-down, over-under, fast-slow, stop-go, far-near). Since a modern city is sensed dynamically, over time, these qualities have become fundamental, and they are used to structure and even to identify, wherever they are coherent enough to make it possible. (Ex. "go left, then right", or "up the steep hill" or "at the sharp bend", or "three blocks along this street"). These qualities are those which reinforce and develop what an observer can do to maintain or interpret direction or estimate distance even without outside reference, i.e., with eyes shut. Under the latter conditions, of course, this ability is usable only over brief intervals. With increasing observer speed, those techniques will need much development in the modern city.

9.   Times Series - provision of sequences and series which are sensed over time, including both simple item-by-item linkages, where one element is simply knitted to the two elements before and behind it (as in the sequence of sharp detail which structure a Venetian callo); and also the provision of a series which is truly structured in time and thus melodic in nature (as in the sequence of spaces in the imperial palace, Peking). The former, simple sequence, is very commonly used, particularly along familiar paths. Its melodic counterpart is more rarely seen, but maybe one of the most important to develop in the large, dynamic modern metropolis.

NON-PHYSICAL QUALITIES

It must be noted that other, non-physical, circumstances may enhance the visibility of an element. Names, for example, are important in crystallizing identity. Naming systems (as the alphabetizing of a street series), will also facilitate the structuring of elements. Meanings and associations. of course, whether social, historical, functional, economic or individual, constitute an entire realm which lies outside the pure physical qualities. They strongly reinforce such suggestions toward identity or structure as may be latent in the physical form itself.

All of the above-mentioned qualities do not work in isolation, but as a total system. Where one quality is present alone (as a continuity of building material with no other common feature), or where qualities are in conflict (as in two areas of common building type but different function), the total effect may be weak,ambiguous, or require effort to iden-

tify and structure. A certain amount of repetition, or redundancy and reinforcement seems necessary to satisfy the great variety of observers, to leave them at ease and with a strong picture. Thus a region would be unmistakable which had a continuity of building type and use, were sharply bounded, clearly jointed to a neighboring region, visually concave, had a simple form, etc.,etc.

SCHEMATIC TYPE

Environmental schemata are of different types varying with individual character, class, occupation, place of work or residence, upbringing, etc. A first attempt is made below at setting up a series of categories by which individual schemata or their parts may be characterized. Having set up these categories it will be instructive later to understand how these differences arise, and how they interrelate with each other.

Images of a city, an element or of one of its parts, may differ between different observers in terms of the relative density of the mental concept, i.e. the extent to which it is or is not packed with detail. Schemata may be characterized as relatively dense, as a picture of Newbury Street which identifies each building along its length or relatively thin, as Newbury characterized simply as a rather narrow street of old houses of mixed use.

Seemingly similar to this distinction, but in fact separate, is the variation along the range between concrete, sensuously vivid images, and those which are highly abstracted, generalized and void of sensuous content. Thus the schema of a building may be vivid, involving its shape,

color, texture, detail etc., or may be relatively <u>abstract</u>, the structure being identified as "a restaurant" or the "third building from the corner".

"Vivid" does not necessarily equate with "dense", nor "thin" with "abstract". A schema may be both dense and abstract, as the despatcher's knowledge of a city street, which relates house numbers to uses along block after block, yet cannot describe these buildings in any concrete sense.

<u>STRUCTURAL TYPES</u>

Schemata may further be distinguished according to their structural quality; the manner in which their parts are arranged and interrelated. We may in general abstract four stages along the continuum of increasing structural precision.

a.)   The various elements are <u>free</u>, i.e., there is no structure nor interrelation between parts.

b.)   The structure has become <u>positional</u>, i.e. the parts are roughly related in terms of their general direction and perhaps even relative distance from each other, while still remaining disconnected one from the other.

c.)   The structure is <u>flexible</u>, i.e. parts are now connected one to the other but in a loose and flexible manner, as if by limp or elastic ties. The sequence of events is known, but the "mental map" may be quite distorted, and its distortion may shift at different moments.

d.)   The structure is <u>rigid</u>, parts are interconnected firmly in all dimensions, and distortions, if any exist, are built in and do not

change. In this situation, the holder of the concept can compute the general interrelation between any pair of elements.

These concepts of free, positional, flexible and rigid may be equated with the methods by which the schema-builders can move through the city. In the first case, rational movement is impossible without outside help, unless a systematic coverage of the entire area is resorted to (which means the building up of a new structure on the spot). In the second case, that of positional structure, movement can be accomplished by "searching", by moving out in the correct general direction, weaving back and forth to cover a band and having an estimate of distance to correct overshooting.

With flexible structure, movement is easier, since it proceeds along known paths, through known sequences. Motion between pairs of elements not habitually connected, or along other than habitual paths, may be very confusing. It is a process of "tunneling".

Where the structure is rigid, then motion is much freer, can interconnect now points at will, and as the density of the schema builds up, it begins to take on the characteristics of a total field, in which interaction is possible in any direction and at any distance.

These characteristics of structure may apply in different ways at different levels. For example, two city regions may both possess rigid internal structures, and may both interconnect at some seam or node. But this interconnection may either include an interlocking of the internal

structures, which means that the whole complex is also rigid, or internal structures may fail to interlock, so that the jointing is simply flexible. This latter seems to occur for many people at Scollay Square, for example.

STATIC AND DYNAMIC IMAGES

The structure may also be characterized in a still different way. For some, their schemata may be organized in a somewhat instantaneous way, as a series of wholes and parts descending from the general to the particular as: city → north side → near north side → near north side west of State Street, etc. This organization has the quality of a static map. Interconnection is made by moving up to the necessary bridging generality, and back down to the desired particular. This type of schema may be called static, or hierarchical.

For others, the schema is put together in a more dynamic way, parts being interconnected by sequences over time (even if the time is brief), and pictured as though seen by a motion picture camera. It is more closely related to the actual experience of the city. This may be called dynamic or continuous organization, which employs unrolling interconnection instead of static hierarchical generalities.

To summarize these categories by an example, one might describe a particular schema of a city region as being vivid, dense, and having a rigid hierarchical internal structure and which is furthermore flexibly interconnected in a continuous manner with various surrounding regions. We have said nothing, of course, as to the interrelations between these

qualities: as to whether, for example, a structure which is both positional and continuous is common, rare, or even possible.

EVALUATION OF SCHEMATA

Schemata may be further categorized in terms of the criteria of value discussed at the beginning of this paper: They may be more of less economical, sufficient, safe, communicable, integrated, or supple. The interrelations of these qualities to the structural and recognition types above would be most interesting.

DEVELOPMENTAL TYPES

It will be also be important to classify schemata in terms of the way they seem to develop or grow, whether originally or at the moment they are used or expressed. Those two senses may or may not turn out to be the same. The latter is the one which is presumably reflected in the sequence of map drawing, or in the way in which relations are expressed. At the moment we seem to distinguish several types:

a.)   Schema which develop from a kernel, from a dense familiar element on which everything is ultimately hung, and which seems to radiate its influence out over a large area.

b.)   Those which develop along and out from a familiar line of movement, in which, for example, a map is drawn branching out from the point of entrance.

c.)   Those which begin by the construction of an outline, which is then filled in toward the center.

d.)   Those which start as a set of areas, which are then detailed as to connections and interiors.

e.)   Rarely, the map or schema grows as a total organized <u>field</u>, which develops at an even rate everywhere, and which can be begun at any point, depending on circumstances.

INTERRELATIONS OF TYPES

The interrelation of those developmental categories to other concepts in this discussion is clear. For one thing, it seems to correspond to categories which are set by whatever type of element is dominant in the schema. Kernel development seems to relate to the dominance of <u>nodes</u>; line of movement to the dominance of <u>paths</u>; outline to <u>edges</u>; set of areas to <u>regions</u>. A schema dominated by landmarks is possible but has not been noted. It might be chaotic. The <u>field</u> type seems to reject any special dominance, and to have the more ideal qualities of a rigid, dense structure. Another way of describing the same quality, therefore, might be to say that there are some who first develop regions, and then thread them with paths; others who first imagine paths and then hang them with regions and so on.

In addition to the developmental types and those which reflect dominance by certain elements, we can also discuss schemata in terns of the form characteristics most heavily relied upon for structure and identity. One type of schema may make greatest use of form simplicity, another of kinesthesia, still another of visual scope, a fourth be addicted to sequence, etc. We can guess at affinities between continuous schema and the use of sequence or hierarchical schema and the use of form simplicity. And as with all the above classes, the most important interrelations to be discovered are those that relate these groups to the value

of the schemata: their economy, sufficiency, etc.

There is an untested implication in all this that the schemata of greatest value are those which most closely approach a strong total field in nature: which are dense, rigid, and vivid; which make use of all element types and form characteristics without narrow concentration; and which can be put together either hierarchically or continuously, as occasion demands. It may prove, of course, that such a schema is necessarily rare or impossible, and that there are strong individual or cultural types which cannot transcend their basic character or emphasis. In this case, an environment must be geared to the appropriate cultural type, or shaped in many ways so as to satisfy the demands of the many individual types which inhabit it.

OBJECTIVES OF STUDY

This study may be said to have three principal objectives to push forward the development of a general theory of visibility; to devise methods of survey and analysis; and to furnish some stimulating suggestions for the future design of cities. These should be touched upon briefly.

In our terms, the fundamental theory of visibility would be one which would enable us to predict the public image resulting when any given form of urban environment is read by a certain cultural group. This prediction of the image would, of course, include a detailed description of its qualities and values. This may be taken as the basic aim of the study, but it must be obvious how far we are from any such general statement. Not only is the sample of observers and cities very small, so that

results are quite lacking in generality, and not only are the techniques used to date crude, and inadequate for describing the schema, but there are also several major blank spaces. These include information as to how the schema is developed, how it is used in operation, and what the interrelation might be between various types of schemata, elements, and form qualities. We need to develop concepts for describing the visibility characteristics of a city as a whole. We are still quite a distance from being able to study the image as a total field system, reacting dynamically and integrally to changes at all points.

RECONNAISSANCE AND INTERVIEW TECHNIQUES

It would not be expected that such a theory would develop in a brief period. Useful results may nevertheless accrue before this time. Such are the development of study techniques which might be valuable in practice. Techniques developed to date may be broken roughly into two classes: reconnaissance methods by which the general perceptual form and visibility of an existing city may be evaluated; and interview techniques which give an approximation of the public image of a city by various observer groups.

The former methods are a new systemization of the subjective, "esthetic" field reconnaissance, based upon the concepts developed in this discussion. The technique includes a general sweep to catch the basic structure of the city in terms of element types and with an eye to how the city image develops as the process; several more detailed field studies of what it is like to "operate" in the city along similar paths;

and a determination of the strategic perceptual elements with a detailed study of their nature.

The techniques for uncovering the public image are still highly experimental. They have included office interviews which go into overall and detailed characterizations of the city plus imaginary "operations" in it; map sketching; recognition and interrelation of photographs; recorded interviews in the field while the subject is operating in it; and the asking of directions from passersby. These multiple survey techniques and the many analytical methods that are associated with them are, of course, laborious and time-consuming. It is hoped that by correlation of their various results, it may be possible to simplify them markedly for use in practice. Thus if it should prove possible to catch the essence of the public image by means of a simple map and photo test, it might then be feasible to assemble a large, balanced, sample for such a test all at one time, and to analyze it within a few weeks.

Both the reconnaissance and the interview techniques could be of real value in the planning analysis of an existing city. Presumably they would point out the strong and the weak points in the perceptual form at the urban scale, the areas of confusion and the gaps, the telling qualities, the strategic centers. This would set the stage for design which wished, among other aims, to heighten the visibility of the city.

These analytical and survey techniques will be described and evaluated in detail in forth0coming reports on the results of particular

studies.

IMPLICATIONS FOR DESIGN

The final aim of our work is to supply stimulating principles and ideas for the future design of cities. It is, indeed, the basic motive for interest in the subject. While much more should be forthcoming at a later date when the theory is farther developed, yet there are a number of hints and ideas which appear already, both in the nature of comments upon forms that have been utilized for purpose of "unity" and "giving shape" in the past, and also certain new possibilities as well. It can be expected that, if nothing else, the viewpoint which looks upon the city as a total visible system will force design attention upon new aspects.

This basic part of the study, partly applied and partly speculative, will be handled in a future paper. It may be well to make two points on this, however. First, no such thing as a formula for design will evolve, but rather a background of analysis, a set of very general principles, and some lending hints - all of which will be useful as support to the skilled designer. Second, we will have to return to consideration of visibility in a larger context if we are to make proper use of the idea: to the realization that it is only one of the aims for restructuring city form, that, for example, a highly visible environment may have certain disadvantages for human growth, as noted in the early part of this discussion. This is an issue that requires careful formulation and analysis.

Appendix - <u>Outline for a Glossary of Terms</u>

Visual field; visual world; schematic world; stereotype.

Schema or image.

Image as: sufficient, economical, safe, communicable, integrated, or supple.

Identity; structure; meaning.

Visibility.

Image level.

Image field.

Public image.

Paths: single, structured or networks; progressive, directional or scaled.

Edges: barriers or seams; progressive, directional, or scaled.

Regions: hard, soft, or unbounded; isolated, linked (mosaics), or continuous; districts
(structured or unstructured) or spaces (introvert or extrovert); thematic unit.

Nodes: hinge-points or cores; introvert or extrovert.

Landmarks: distant or local; isolated, clustered, sequential or patterned.

Complexes.

Image identity as: dense or thin; vivid or abstract.

Image structure as: free, positional, flexible or rigid; hierarchical or continuous.

Image development as: kernel, line of movement, outline, set of areas, or total field.