

Urban Form as Product or as Resource:

On some methodological problems in the study of urban morphology

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In his book on the city the sociologist Michelson laments the general backwardness of morphological research and holds the "insufficient" conceptualization of the physical environment as a primary cause. Opinions will undoubtedly vary as to what constitutes a sufficient conceptualization, and whether insufficient conceptualization is the consequence or the cause of the backward state of the field remains a moot question. However, there is a general feeling among urbanists that the study of urban form has lagged far behind the functional study of the city, both in the amount and in the quality of the attention paid to it.

This is a rather curious phenomenon requiring explanation, since there is no intrinsic reason why morphological investigation should be less interesting, less productive, less relevant or more difficult than research in function. It becomes even more question-begging when we recall that understanding morphology is not only one of the oldest and, once, most central concerns of urban disciplines, but also a precondition necessary for an effective management of our urban physical environment.

This essay is an attempt to analyze some of the reasons why the study of urban morphology has remained relatively unproductive. Without denying the importance of other factors—economic, sociological—I shall argue that a major source of the problems is conceptual, i.e., that traditional urban studies with their conceptualization of the physical environment solely as product without autonomy, are irrelevant to the study of urban morphology. I will further show that this "product" view is an inevitable consequence of dualist thinking, giving unquestioned primacy to the "free will" (of human shapers of the city), rather than to the catalyzing role of the physical environment as an autonomous entity. As a way to overcome this dualism and its unfortunate consequences, I shall

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propose to consider the physical environment as a resource, and discuss some methodological implications of this approach.

Let us begin by making an elementary distinction. Without worrying too much about the ontology of the city, we may readily distinguish between two types of statements made about the city and its relationship with people: first, statements about form or morphology of the city; and second, statements about processes that go on in the city or physiology of the city.

Statements of the first type describe "bricks and mortar" of the city. They are about corporeal aspects of the city (buildings, roads, squares, parks, land form, etc.), about their states and spatial pattern. They may refer to visible cityscape, to internalized mental image, or to spatial organization such as blocks and parcels, which in themselves are not visible. In any case, they describe contents of the spatio-temporal basis of urban community.

Statements of the second type are made essentially about people. These statements describe who they are, what they do, and how. They are concerned with values and customs of the city's inhabitants, with their activities and institutions, with business transactions and information exchange, with intentions and so on. It is characteristic of these statements that they refer in one way or another to urban processes.

It hardly merits elaboration that these two kinds of statements are distinct, that neither is completely translatable to the other. There is, clearly, no logical connection between the two types of statements; statements of morphological form in no way logically entail statements of functional processes, and *vice versa*. Thus, any attempt, whether materialist or idealist, to construe one type as equivalent of the other inevitably risks the danger of making reductionist errors.

Given that there is no direct logical connection, an urgent question is: what is then the mode of relationship between the two types of statements? Or put more directly in a realist fashion, how does morphological form relate to physiological processes?

Among many possible answers to this question, let us first consider what one may call a "dual aspects" position. This is perhaps the position which is held most widely by the students of the city, tacitly or explicitly. According to this position, morphology and physiology are related as two mutually exclusive but complementary aspects of one and the same entity, the "city." The "city" itself, it is further claimed, is neither form nor process, but has underlying unity which guarantees complementarity between form and function, product and process, morphology and physiology. An obvious analogue of this

position is body and mind relative to a person.

This position, despite its immediate appeal to common-sense, offers only a pseudo answer to the question, as it brings us back to the original question: how there are two possible ways in which morphology and physiology can be aspects of the entity, the "city." The first possibility is that they are intrinsic to the city and thus independent from our viewpoints. The difficulty in this case involves positing some essence of the city, which is neither morphological nor physiological itself, but is capable of assuring their ultimate unity. The difficulty here is similar to one in suggesting that there is something in a person which is neither physical nor mental and yet provides underlying unity.

The second way in which morphology and physiology can be aspects of the city is by their being extrinsic to the city. In this case, distinction between these aspects is a function of viewpoint, approach or conceptual framework of us relative to the city rather than being intrinsic to it. The problem we encounter here is clear: this position is unilluminating as far as the nature of the relationship between morphology and physiology, and between form and process is concerned; it fails to respond to the initial question, unless it offers an explanation as to how the two viewpoints relate to each other.

So back to the question: how is morphology related to physiology? What is the pattern of relationship between form and function, form and meaning? What sorts of theories or viewpoints are there concerning this question?

In addition to the above "dual aspect" position, a couple of extreme, polar positions may be easily refuted: determinism and relativism (or associationalism).

Determinism in our case is those doctrines which posit necessary causal connections between form and process, morphology and physiology. It maintains that choice on either side is sufficient to cause choice in the other, as in the case of the mottos "form follows function," or "function follows form."

Experience, more than logic, shows that such is not the case. As is plain to see, there is no perfect "fit" between the two sides of the motto in actuality: the same activity can be performed in places of widely varying form, size, etc. ("eating" in a dining room, kitchen, street, park,...), while the same morphological form can be useful for a wide variety of purposes, functions, and has proven to exist under greatly diverse socio-cultural contexts. (A significant portion of today's cities, built centuries ago, have withstood changing urban processes.) In addition to the above difficulties, determinism is confronted with another problem. As morphological elements and physiological events are so utterly

different, it is difficult to see how there could be causal connections between them.

If determinism is untenable because of its fallacious assumption of perfect "fit" between form and function, form and meaning, its opposite viewpoint, relativism or associationalism, remains unilluminating because of its refusal to recognize, contrary to our common-sense experience, any causal connections between the two sides. According to this viewpoint, morphology and physiology are related not in a cause-effect manner, but as simple associations, which are occasioned by people's activities simultaneously on both. Melvin Webber's thesis "community without propinquity" exemplifies this position. According to this thesis, morphology of a community's geographical base—its form, area, topography, etc.—is irrelevant to its being socially a community, i.e., its sharing a sense of common purpose, background, interests, etc.; what creates a group of people into a community, is solely people's voluntary associations among them, and morphology plays no causal role in people's neighboring activities.

While commendable for rejecting determinism and upholding the "free will" of people as creative agents, relativism goes too far in that direction. It is thus equally untenable, and inherently transitional. Experience shows that free, random associations have their limits and that the relationship between form and process is not that arbitrary. Geometric properties—size, area, volume, shape, etc.—have clearly use and meaning implications. To show the existence of causal relationship one needs only to cite works of D'Arcy Thompson and Walter Chrystaller.

Another objection may be made to relativism. It is, as previously stated, characteristic of relativism to deny any possibility of causal connection as a matter of principle, i.e., as a consequence of its position against determinism. My contentions are: first, one need not reject causal connections to avoid evils of determinism; and, second, rejection of causal relationship is heuristically unproductive. The reason for the first point is clear. What makes determinism unacceptable is not its reliance on causal principle *per se*, but its claim of sufficiency: the claim that the presence of "A" is *sufficient* to cause the event "B." It is perfectly possible that A causes, but does not determine B. Consequently, what needs to be rejected to overcome determinism is an assumption of sufficient causation relative to form and process, which does not entail, on the other hand, the rejection of an assumption of necessary causation. As to the second point on heuristic value, we defer discussion to the second part of this paper, where we shall be comparing orientations to urban morphological study.

So far, we have considered three possible, and quite commonly held, viewpoints regarding the nature of the relationship between morphology and physiology of the city. They are "dual-aspect" theory, determinism and relativism. We have found each of them to be deficient and obscure in some ways, on both logical and empirical grounds. The question, then, is where have these considerations led us? What other positions are logically possible, and what approaches have actually emerged in the history of urbanism?

Morphology-as-product and Morphology-as-resource

Both determinism and associationalism are extreme positions. Their inherently polemical character makes them highly conspicuous in the inherited history of environmental thought, but the acceptance by "normal" researchers of these positions has remained limited because of this same quality they share and their inherent problems, which we have already noted. The approaches that have gained broader acceptance in the field of urban morphology are far more restrained in both scope and claim; they are willing to concede that there is some kind of causal connection between morphology and physiology; however, they reject the idea that this connection is constant or irrevocable.

Even if both determinism and associationalism are rejected in favor of some more cautious causal approach, a position still has to be taken *vis-a-vis* the nature and source of causal connection. I contend that there are essentially two basic options between which a choice has to be made, and I further contend that this choice involves far-reaching methodological ramifications, as it will in large measure determine the types of questions to be raised, the terms of analysis to be adopted and the mode of explanation to be offered.

The first option shall be called the "product" approach for want of a better term. This approach is characterized by its unwillingness to consider morphology as cause. From this approach, the cardinal point about the city is that it is man-made, that it is an artifact originated and modified by human intervention. That the city is also part of the human environment, and thus capable of affecting the lives of its inhabitants, may not be denied in principle, but in practice is considered uninteresting, irrelevant, or of secondary significance. The product approach thus assigns causal (and even ontological) primacy to people and hence physiological aspects of the city, whether economic, cultural or social; the causal connection is therefore considered only one directional, going from physiology to morphology and never vice versa. "Form follows function" is what is claimed by this approach.

It is, then, fundamental to the product approach that morphology is seen as mere symptom, expression, or dependent variable, a by-product of the city's physiological processes.

The second option, the "resource" approach, differs from the product approach in its insistence on taking morphology as cause as well as effect. What strikes proponents of this approach as being most significant is that the physical environment is "*environment*". Consequently, it is stressed that, although man-made, the environment transcends its creator and the original conditions of and motivations for its creation, defining contexts for people's activities (including their intervention on the environment) and delineating a collective framework to which individual actions must correspond. Seen from this point of view, morphology is, therefore, resource capable of causally affecting, that is, limiting and catalyzing various physiological processes within the city; it is in no way a mere epiphenomenon, but is in its own right a category of reality.

The above distinction is certainly one between ideal types. As such, it is not a comparison between actual theories with their detailed complexity but one between broad conceptual traits abstracted from two groups of theories. In no way does it deny the diversity that is possible and exists among actual interpretations of the city in terms of emphasis, detail, or conclusion.

To acknowledge this, however, does not deny that the two options are mutually exclusive, nor does it diminish the importance of their methodological consequences. Just as it is visually impossible to focus on both figure and background simultaneously, we can, at least under traditional logic, only conceive of the same thing as being simultaneously symptom and cause at the expense of coherence and consistency. To incorporate within one theoretical framework the two competing theses, "form follows function" and "function follows form" is easier said than done. Likewise, it is one thing to pursue non-morphological origin of urban form through investigation of precedents, intensions, programs, etc.; and it is another to explore consequences of urban form once it has come into being. While the two may not necessarily be contradictory or incompatible, one neither entails nor presupposes the other.

To come to my main point, an issue I wish to raise through this distinction is one about the relative merit of the two approaches in the context of morphological investigation of the city. I have two interrelated theses about this. My first thesis is that the product approach has largely dominated the history of urbanism in general and that of morphological research in particular. My second thesis is that the product approach, and the

traditional theories of urban physical environment based on this approach are grossly insufficient, if not irrelevant, for our attempt to understand morphology, because morphology cannot be completely submerged under the idea of intensions, creations, or circumstances.

The Product Approach: Cases:

It is, needless to say, hazardous to attempt a generalization of the recent history of such a complex discipline as that of urbanism; indeed, it is hardly a unified field with a clear disciplinary identity and boundary and a commonly accepted method; it is, rather, a loose conglomeration of overlapping researches with diverse interests, purposes and problems; to which many fields contribute—architecture, planning, geography, urban sociology, and urban anthropology, being among them—and many of them are only peripherally relevant to aspects of urban morphology.

Acknowledging the above, and without overlooking the diversity of actuality, one can still observe the general predominance of the product approach over the resource approach. The majority of literature on the city is concerned with some physiological processes of the city: specific interest varies. It could be directed at either the workings of the economic, social, political forces and mechanisms, or at their spatio-physical manifestations in the form of land use, location of functions, or areal differentiation. On the whole, morphology is considered either as a resultant or as an irrelevant category.

Even when we confine ourselves to a narrower area where aspects of the physical environment remain a primary subject of enquiry, we find the continuation of the same pattern. The general procedure here is to start from the physical environment (or some aspect of it) as effect and problem, and to look back in order to decide on the determining factors of the given physical environment. What is considered to be a primary factor varies depending on the emphasis of a particular theory. Thus, for the ecologist, morphology is essentially an outcome of competition between population groups for the use of land resource, or, for the students of land use, it is a by-product of the decisions made by the people on the location of functions, where morphological initial conditions are largely ignored; for others, the primary determining factor for urban form is technology, especially transportational means and capabilities; and for yet others, it is the cultural disposition of the people that is most responsible for urban form.

Reliance on the product approach is particularly pronounced in those theories and interpretations of the city which have emerged in architecture or its cognate fields. There the dominant interest is in the question of origin or source of physical form; of authorship, precedent, and intentionality (e.g. what was the real intention of Sixtus, when he had built?). Morphology is customarily explained in the light of a program, an intention, or a cultural orientation, be they real or imaginary. (The medieval city's organic form is the result of medieval society's communalistic value orientation.)

There are, of course, many exceptions, the major ones being those studies of environmental cognition and perception where the interaction between individuals and the physical environment is actively explored; and researches by urban ecologists who concentrate on the reciprocal relationship between people and place. These, however, remain a minority: the historical dominance of the product approach is clearly evident.

In the following I consider some typical examples of the product approach. Two theoretical orientations—cultural and historical—seem particularly appropriate for a closer examination in view of their especially lasting stronghold on the traditional investigation of the physical environment.

Urban Morphology as Cultural Artifact

A variant of the product approach that has remained particularly influential in the study of urban form is one that considers the physical city mainly as a resultant, or an integral part of the inhabitants' culture. A broad orientation may be recognized in the geography and historiography of the urban environment, which stresses the causative role of culture in relation to urban form and endeavours to explain the observed characteristics of urban form in the light of society's shared values, customs, intellectual orientations and the like.

This emphasis on culture as being both the cause and content of urban form characterizes the work of many scholars. For Mumford, for example, the physical city is not a place of business or work but a "gigantic storage facility transmitting culture from generation to generation." In a similar vein, J.B. Jackson finds that the purpose of the city is to "manifest cultural values," and, therefore, the morphological study is an exercise in discovering such cultural values through careful observation of the physical form.

For some, the physical organization of the city is meaningful in that it embodies people's

metaphysical beliefs about the world. Wheatley, for example, considers the spatial construction of the medieval city as being *imago mundi*, whose paradigmatic model is the medieval cosmology. Rykwert echoes the same view, when he attempts to explain the "source" of the orthogonal planning in the mythological universe of the ancient civilizations. Many similar interpretations can be found among anthropologically inspired studies of the cities, ancient or modern.

Often, culture is defined in emotive and valuational terms rather than in intellectual or philosophical ones. An example may be Firey, who suggested that sentiments, symbolism, and other shared values of the inhabitants, more than economic considerations, determine the physical structure of the city. More recently, Garvan has analyzed the spatial pattern of colonial Philadelphia, where he argues that colonial Philadelphia is an artifact of the cultural intensions of the Proprietor and his Colonists.

The distinctive thing about culturalist interpretations of the city is the *teleological* form of argument which they commonly adopt. Implicit in most of these interpretations are the ideas that urban processes are fitted together to bring out resultant morphology, and that morphology, as the teleological end-product, is inherently coherent and intelligible. The notion of goal-directedness of human actions, the assumption of the fit of physical form with cultural content; and the axiom of organic unity—applied to both morphology and culture—are fundamental to culturalist orientation. In its barest form the culturalist argument runs as follows.

- 1) The urban physical environment is a teleological order; it is the intended result of people's purposeful and coordinated activities.
- 2) The activities that produce and modify the physical environment are systemically associated. Culture provides the framework that guarantees this type of association.
- 3) The morphological form of the urban environment is unified and is expressive of its cultural origin.
- 4) Similar forms (effects) have similar cultural sources (causes).
- 5) We can give an intelligible explanation of urban form only by giving reference to its cultural source.

It is clear that the first two points form the hardcore of culturalist orientation, whereas the remaining points are logical extensions of the first two. The first point, which may appear trivially true, when taken individually, is particularly significant in what it cannot admit. It cannot, for instance, accept the idea that the city maybe the *unintended* conse-

quences of human actions. This idea is unthinkable for the proponents of the culturalist viewpoint, because, for them (1) no human activity can be without purpose, explicit or implicit, and (2) no discrepancy can exist between the realm of intent as cause and the realm of product as effect.

Seen from the culturalist viewpoint, people act (and think) not only purposefully but also in *coordination*; various activities that cause the creation and modification of the city, do not occur at random or in mutual isolation, but take place as closely associated and interdependent phenomena; they form, as is often suggested, an organic whole. It is also posited that this wholeness is unfailingly present, because the very nature of culture is to provide a collective and coherent framework for people so that they can act interdependently, in accordance with this framework.

An expected consequence of the above presuppositions is to consider the physical environment as a unified whole. Given the unity and coherence presumed to exist at the level of intent, the physical environment as an end-product must reflect, embody, and express the same qualities. It is on these grounds that urban form is taken as a sign/emblem of and an index to the contents of its cultural origin. Also posited on the same grounds is the notion that morphological similarities indicate (and are caused by) cultural affinities, or, put differently, the assumption that homology and analogy are correlated.

From the foregoing presentation, it is obvious why culturalist orientation is a variant of the product approach. The analysis of urban form carried out from this viewpoint has its primary aim in establishing teleological connections between physical aspects of the city as effect and content of culture as an organic shaping force. This analysis proceeds in three steps: (1) establishment of areal classifications on the basis of formal similarities and dissimilarities, (2) observation and description of characteristics of a given area (or a given group of areas) in its entire singularity and uniqueness, and (3) explanation of the area—its “personality”, history, or its relation with other areas—by giving reference to cultural factors.

Morphology as Palimpsest of History

In the study of morphology as cultural product it has been usual to focus on synchronic analysis of a selected place to establish characteristics unique to it. Numerous monographs have been written in this spirit dealing with a great number of individual cities and

towns. Another approach, which is complementary to the above synchronic emphasis and has also been pursued widely, is one that considers the pattern of diffusion of specific morphological traits over space and time as a way to study cultural contact and propagation. Examples of this approach include Stanislawski's study of the origin and diffusion of the grid-iron plan (where he argues Mohenjo-daro to be the place where it originated) and Trewartha's works on house types in Louisiana. In this approach morphology is considered not only as an areal product of culture but as a part of culture itself, a cultural artifact that is not bound to the place of origin but rather one that can be learned, copied and propagated.

Yet another theoretical orientation is history. Since the pioneering works of German and French geographers at the end of the nineteenth century, many students of urban form have approached the city from a historical perspective. For Dickinson, for example, urban morphology cannot be separated from general history of the city, as it is "the study of the lay-out and build of towns viewed as the expression of their origin, growth and function." Examples of historically oriented works of urban morphology range from Lavedan's *L'histoire de l'urbanisme* to Conzen's "Alnwick: a study in town plan analysis." Recent contributions of Reps may also be seen in this context.

If the historical study of urban morphology is to be more than a simple chronicle of environmental changes or a taxonomic collection of past urban forms, it inevitably involves interpretation and explanation: a historian must engage in the methodological enterprise of classifying, categorizing, and positing relevant relationships between materials. Such an enterprise is no different in its logical form corresponding operations in synchronic investigations such as we have seen in the culturalist approach. Conversely, researchers with synchronic interests must rely on history for the supply of controlled materials with which they test the validity of their theories and hypotheses. What distinguishes historical from synchronic orientations lies, then, not so much in the absence of functional, cultural or ecological concerns as the compulsory presence of some schema or models dealing with aspects of time, change, transformation.

Envisaged from this point of view, many of the early "historical" studies of past town plans and building forms, mostly by the pioneers of human geography in Germany and France at the beginning of the century, do not fall within the category of a historical orientation. While dealing with historic towns, they tended to focus on establishing taxonomies of such static aspects as street lay-out, building forms and the like rather than

concerning themselves with the phenomena of urban growth and change.

An explicitly history-oriented approach, termed "plan analysis," characterizes recent contributions of a group of British geographers including Conzen, Davies, Carter, Steadman and Smailes. These authors consider the internal structure of the city as a result of a historical evolution which cannot be properly understood unless discrepancies between origin and growth, form and function are recognized. Among these geographers Conzen provides the most meticulous analysis of cities using the most explicit methodology.

For this group, the primary subject of empirical investigation is the town plan, the "topographical arrangement of an urban built-up area" consisting of complexes of streets, plots, buildings and their arrangements. Town plan is considered most amenable for historical analysis, since it tends to be the most enduring, conservative aspect of townscape and hence acts as an inevitable framework for other manmade features that change more easily.

Thus these geographers consider town plan mainly as a kind of historical text, a collection of morphological records telling of past social, cultural, and economic fluctuations. They see the city not as a unified, organic whole (as the proponents of the idea of cultural landscape postulated) but as an aggregate of heterogeneous parts of differing origin and background. They emphasize a process of growth, cumulative addition or retrieval of parts rather than holistic shifts in which one landscape totally replaces another. Conzen expresses this when he observes that a town plan is "a kind of palimpsest on which features contributed by any particular period may have been partly or wholly obliterated by those of a later one through the process of site succession or in some other way."

The basis purpose of plan analysis is then to disentangle the observed town as a palimpsest, to work back from the present town plan and determine various "functional impulses" that have successively shaped the plan. The analysis usually proceeds in three steps: 1) first, the present town plan is examined to determine "plan units," each of which is identified by morphological homogeneity, i.e. consistent pattern of plots, street types, etc., and is linked with a specific phase in history (for the town of Alnwick, for example, Conzen recognizes fourteen major and forty-nine sub-types); 2) once componential units are determined and described, physical growth is analyzed in stages, where particular emphases are given to configuration and pattern of parcel, types of buildings and models of change (i.e. concretion, accretion, repletion, etc.); 3) the last step is to

explain physical growth in the light of changes in socio-economic structures, the task which involves sorting out aspects of such changes that are directly relevant for morphological changes.

It is important to note here, in this last step, the historical analysis of town plan recapitulates in part the concern of the culturalist orientation as cultural factors are brought in to explain in part the genesis of plan units. However, here they receive neither the primary nor exclusive attention that they claim from researchers with the culturalist perspective, whose primary concern is with applying the concept of culture to the phenomena of urban morphology. In approaching town plans historically, the above geographers have considered cultural factors as one, and not necessarily the most prominent, among many forces that shape the urban form. In fact, the general tendency among these students has been to stress the role of infrastructural aspects, such as the system of land tenure, functional hierarchy of cities, techno-economic bases, political organizations and the like rather than cultural ideals, tastes, or sentiments.

Because they have chosen to concentrate on structural, more objectively measurable and accountable properties of urban form instead of phenomenological expressions and symptoms such as visual scenery or image, the students of the plan analysis approach have been able to produce some of the most rigorous and exacting accounts of morphological developments in the field. The indices Conzen devised for the measurement of long-term plot changes, or the careful categorization of the kinds of morphological changes he proposes, for example, seem widely applicable beyond the cities in whose context they were formulated.

More importantly, the attention given by these geographers to the fact that the urban plan is not a unitary entity, but a framework having an internally differentiated structure whose components have differing rates of change, represents a significant improvement over the familiar unitary conception of urban morphology. It has allowed them to deal with incremental changes and local transformations in the physical environment (such as changes in parcelling) without involving the assumption of areal unity, of local changes being necessarily integrated into a process of succession and replacement of unitary wholes, as a more holistic approach would have it.

Despite these positive contributions, however, the program of plan analysis falls short of dealing with urban built environment *qua* environment. Still remaining at the core of this program is the "product-form" approach, which, as we have seen, considers the

environment primarily as an end result and symptom rather than as an independent variable taking on a causal role.

Although the limiting and catalyzing capacity of the morphological framework is admitted in theory, in actuality no systematic efforts have been devoted to empirical exploration of this capacity. The plan analysts decompose the urban plan to a mosaic of heterogeneous parts and explain them in the light of their historical origins. How parts affect one another as constraints and catalysts, both spatially and developmentally, is the question that has been left unanswered. This is to be expected from a program of research which sees itself as a sub-area of urban history; its ultimate goal lies not in understanding the workings of the physical environment per se but in augmenting the historical investigation of the urban society through the analysis of its physical form.

Urban Form As Environmental Resource

In the foregoing discussion I examined several methodological orientations that have been particularly influential in the study of urban form. In this discussion I argued that they share a common syndrome of considering urban form solely as an end-product of some external forces or processes and criticized them for not attending to the limiting and catalyzing role of which physical form is capable. I have also suggested that this "product" view is a consequence of an overblown reaction to the claims of environmental determinism, and that it too is still trapped in the dualist, deterministic mode of thinking it attempts to counter.

In this section I attempt to sketch an alternative orientation, one that considers the physical aspects of urban form as environmental resource, man-made but not contrived. The aim is to reconcile the confusing dualism of human activity and culture on the one hand, and the physical environment on the other, in order to redistribute the causal weight each element carries in making up urban form. Admittedly, there is considerable ambiguity in the use of the concepts environment, and resource, not only in the literature of architecture and urbanism but in ecology where they are central concepts. Besides, there is the undying legacy of the dualist world view in Western thought. I cannot, therefore, hope to resolve conceptual issues in adopting these concepts or even to survey them in a comprehensive manner. The more limited purpose is simply to suggest some emerging ideas and attempt a tentative outline of methods making use of these ideas.

The Concept of Environmental Resource

The hard core of the proposed orientation has already been stated: that urban form is not only the end product but also an environmental resource. The statement seems obvious to the point of being trivial: that urban form is a part of the surroundings, the setting of man; that it impinges on him from outside, as opposed to those forces that originate within him; and that it is a source of supply held in reserve which can be utilized and exploited by man. This obvious and hardly objectionable hard core has, when we begin to examine it, far reaching ramifications, which are by no means consistent with some prevailing attitudes in the received theory of urban form and design.

This "environment-resource" orientation is characterized by its concern with the limiting and enabling roles of the physical environment and of urban form as an aspect of it. According to this orientation, urban form plays a permissive or limiting role, offering opportunities in certain directions and impeding them in others. To paraphrase Popper, urban form is man-made but is semi-autonomous and transcends its maker.

The extent to which this position contrasts with either the "product" view or the "environmentalist" view needs no elaboration. While the "product" view says man is the creator of his world, and while the "environmentalist" view maintains that human culture (including his city) is largely determined by his physical surroundings, the "environment-resource" view proposes that the physical environment, while originating as the product of human activity, can be subsumed neither to the human nor to the natural realm completely, having instead a degree of autonomy. It is important to note that, from this point of view, neither human activity nor purely physical constraints are assigned causal priority in shaping urban form. While each may have a causal role, neither has a *deterministic* function. Thus, urban form, created in part by both, takes on independent life and can itself carry causal significance.

To be specific about what constitutes an environmental opportunity or limitation and what comes from man's interventions is difficult and may not be possible in absolute terms. This, however, does not mean that the environment has no causal importance; it merely points to the fuzziness of conceptual categories we have inherited from the world view based on the man-nature dualism. To illustrate "unintended" consequences of urban form:

Cities of Spanish American origin are noted for the relative absence of blight in connection with succession in land use (Beyer, *Urban Explosion*, p.310). Undoubtedly, many non-physical factors contribute to this: stable population and economic growth, the custom of keeping land within the family, and the late introduction of zoning control. However, flexibility in the initial urban form should not be overlooked, as it provided conditions within which other factors would operate: the grid system, stipulated by the Laws of Indies, was not only easy to extend by adding more blocks but undifferentiated, inviting no specialization of functions. Furthermore, there was a generalized building type which was capable of many different functions. Blocks were large and thus contained a reserve of land in the middle that could be developed when the need arose. (Gakenheimer, in Beyer, *op. cit.*, pp.49-51).

As an example that shows how an urban form transcends its maker and becomes an institution in its own right, we may consider London after the Great Fire of 1666. The fire cleared a large portion of the city, creating an unusual opportunity to design the city anew. However, the plan finally adopted and implemented deviated little from what existed before: the antecedent plan had become so entrenched as an evolved order that it resisted pressures for change the occurrence of the Fire had induced.

Semi-autonomy of Urban Form

We have used the above examples to illustrate the point that urban form is endowed with a certain degree of autonomy and that its long-term effects and consequences are in no sense completely created by us. To the extent that it is man-made, not naturally given, it belongs to the world of man as do spoons, knives, hammers, works of art. At the same time, it is a part of man's surroundings in contrast to which his world is defined; it constitutes an objective realm and impinges on us, forcing us to reckon with it and adapt our actions to it. The order of this realm is not necessarily consonant with that of its residents; it is as much discovered as made by us. We can act on it, add to it, or even destroy it. But the nature and extent of potentials, limits, constraints remain.

The second source of environmental constraints is the geometry of the environment itself. Urban form is an organization of space; it differentiates the continuum of space into parts with varied sizes, dimensions and positional endowments and relates them into an organized whole. "Resourcefulness" of these parts varies in kind and degree depending

on the shapes and sizes of the elements and of their relations within the whole plan. Obviously, small parcels are less useful sites for institutions or production facilities than for houses or stores. Straight, continuous streets with many parcels fronting on them are better suited to the needs of pedestrian oriented retail facilities than streets with many crossings and few parcels (Ward, 1972). When blocks are too big relative to the serving streets, they are often subdivided to smaller ones as in New Haven, or receive alleys as in Richmond, Virginia. Thus the geometry of the environment which we manipulate to solve our specific needs in turn becomes the condition of such manipulations, opportunities as well as problems.

From the foregoing discussions, it is clear that the "resource" orientation is characterized by its emphasis on the reciprocity that inheres in all environmental processes: duality because the urban form is *simultaneously* symptom and cause, and reciprocity because actions generate forms and forms constrain actions.

This emphasis invites some formidable conceptual problems for which there do not seem ready answers: How can symptoms be simultaneously cause? Where is the boundary between environment (resource) as given and environment (resource) as exploited by man? How can one explain environment *in terms of* environment without being tautological?

Instead of trying to solve these problems logically, we propose to deal with them *operationally*. These conceptual difficulties reflect the inadequacy of our inherited conceptual schema rather than any unfruitfulness of the concept of environment as a heuristic, as used in ecology and anthropology. As Bates, a noted evolutionary biologist, notes, there is "no way of getting along without [the concept of environment]," and "if we tried to avoid fuzzy words, all verbal discourse will stop." (*Ecology and Evolution*, pp.552-53).

Morphological Base and Surface

The above conceptual difficulties may in part arise due to the received tendency to consider the "environment" as a unitary entity with no layers of levels. To explore the environment as simultaneously symptom and cause, it seems crucial to distinguish at least two levels: environment (urban form) as a given framework, and environment (urban form) as utilized and experienced by man, or, in a proposed terminology, "morphological base" and "morphological surface."

“Morphological base” refers to the sum of those resource characteristics or environment that can potentially be influential for the users. It is a property of the whole group, regardless of the fact that it may have originated as the result of individual actions, in the sense that its constraints and potentials are attributes of the environment and not of its users. In its capacity to influence the nature of individual actors’ decisions, it may be considered as a collective framework, structured and differentiated.

The potentials in the “morphological base” are realized and made concrete through individual actions, the result of which constitute “morphological surface.” It is the phenomenological side of environment; it refers to the totality of all influential features of the environment that directly impinge on the daily life of users. Unlike “morphological base;” thus, “morphological surface” is time-specific and user-specific: its content varies depending on who users are and when they use the environment. It is particularizing, as “morphological base” is generalizing. It is the “performance” side of environment rather than the “competence” side. It is the cumulative consequences of adaptation, not the conditions for adaptation.

It should be emphasized that these two concepts refer to interacting levels of the same entity rather than to categories of separate realities. “Morphological base” to a large extent defines the characteristics of the “morphological surface,” while it is realized only through the latter. This distinction thus allows us to examine urban form as both cause and consequence: the experiential side of environment, that is “morphological surface,” is seen not as a product of socio-economic forces or individual creativity but as a consequence of adaptive adjustments between these forces and potentials set by the “morphological base” in the environment.

Conclusion

As a way of examining the theoretical basis for the study of urban morphology, we have so far discussed some problems associated with the notion of the physical environment. We have seen that two tenets characterize the approaches to urban morphological investigation: a dualist schema that sees man and the environment as disjunct categories; and the assignment of causal priority to one of these two categories. We have noted a determinist characteristic in the assignment of priorities, whether the orientation is culturalist, or environmentalist. Between these two forms of determinism culturalist has been seen to

be the more dominant. I have argued that this orientation is not only methodologically simplistic but also heuristically unproductive. As an alternative, I have proposed to approach the physical environment as a resource, an autonomous entity having a causal yet nondeterministic role relative to human aspects of the city. It has been suggested that basic aspects of the physical environment as resource are the thesis that it is internally organized, and that this organization is hierarchical. How this level structure is constituted and functions is a task for further enquiry, but the notion has far reaching potential for methodology, for historiography and for design. From this point of view, the task of morphological study is to examine ways in which the physical elements interact with one another both within and between levels in the hierarchy, and to explore how the hierarchy as a whole affects the way the city changes and is used by its inhabitants. Seen from this point of view, design is primarily the definition of the organization of the physical environment, rather than either making a comprehensive or unitary product or offering cultural commentary.