GSAPP - COLUMBIA UNIVERSITY

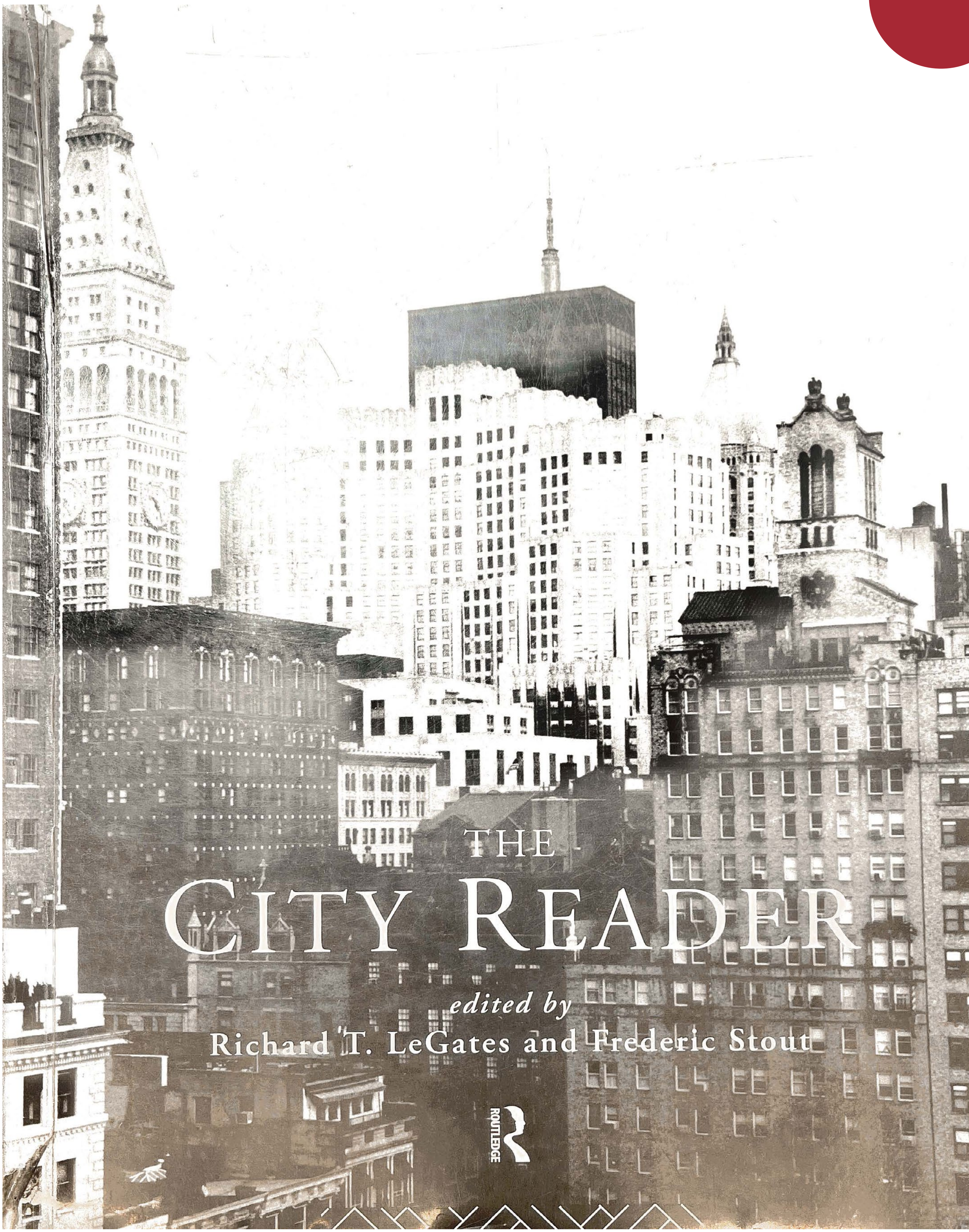
# MSAUD SUMMER SEMESTER 2025

## READER

# WEEK 6

Alexander, Christopher, "A City is Not a Tree," *Architectural Forum* [April 1965]: 58–62

UDHT



# THE CITY READER

*The City Reader* brings together the very best on the city. Classic writings by such authors as Robert Park, Lewis Mumford, Raymond Unwin, Jane Jacobs, Le Corbusier, and Kevin Lynch meet the best contemporary writings of, among others, Peter Hall, Mike Davis, Saskia Sassen, Dolores Hayden, and Manuel Castells.

Fifty generous selections are included. Each piece is separately introduced with a brief intellectual biography, a review of the author's writings and related literature, and an explanation of how the piece fits into the broader context of urban theory and practice, competing ideological perspectives on the city, and the major current debates concerning race and gender, global restructuring, the impact of technology, and postmodernism.

**Richard T. LeGates** is Professor of Urban Studies at San Francisco State University.
**Frederic Stout** is Lecturer in Urban Studies at Stanford University.

# THE CITY READER

*edited by*

*Richard T. LeGates*
*and*
*Frederic Stout*

1996

ROUTLEDGE
London and New York

First published 1996
by Routledge
11 New Fetter Lane, London EC4P 4EE

Simultaneously published in the USA and Canada
by Routledge
29 West 35th Street, New York, NY 10001



Typeset in Sabon by Solidus (Bristol) Limited
Printed and bound in Great Britain by
Clays Ltd, St Ives PLC



*British Library Cataloguing in Publication Data*
A catalogue record for this book is available from the British Library

*Library of Congress Cataloguing in Publication Data*
The city reader / edited by Richard T. LeGates & Frederic Stout.
p. cm.
1. Urban policy. 2. Cities and towns. 3. City planning.
I. LeGates, Richard T. II. Stout, Frederic.
HT151.C586 1996
307.76—dc20 95-37262

ISBN 0-415-11900-6
0-415-11901-4 (pbk)

# CHRISTOPHER ALEXANDER

## "A City Is Not a Tree"

### *Architectural Forum* (1965)

**Editors' introduction** Many design professionals admire and attempt to incorporate into their designs for the built environment elements reflecting underlying human psychological and spiritual needs and cultural values. But none has broken so completely with conventional architectural practice and sought more deeply to make his designs reflect these fundamental values than Austrian-born, British-trained, U.S.-based architect/planner Christopher Alexander.

Alexander is a self-proclaimed iconoclast, deliberately distancing himself from virtually all the major mainstream currents of twentieth-century architectural and planning thought. It is notable that the eight "treelike" plans he singles out for attack in the following selection represent a diverse set of the most respected and famous twentieth-century plans from Le Corbusier's plan for the new town of Chandigarh, India, based on his principles for a contemporary city (p. 368), to Paolo Soleri's visionary megastructure of Mesa City in the Arizona desert (p. 454).

Since publication of his provocative early attack on the sterility of formal "treelike" city plans in the following selection, Alexander has been engaged in a lifelong search to decipher the deep structures underlying human needs and to define recurring patterns for a new paradigm of architecture. The following selection is clear that a city should *not* be designed with a neatly branching treelike organization dividing functions from each other. Alexander condemns tidy city plans which lay out discretely bounded neighborhoods, zone one area for housing and another for business, or establish areas just for universities or cultural facilities. He sees human activity as much more complex and overlapping than that.

Alexander's approach to describing how cities *should* be designed in this selection may trouble readers who seek clear, rational guidelines. He takes the position that not enough is yet known about how to design non-treelike cities to provide definite answers. Like an artist or a Zen master instructing an apprentice, Alexander closes this selection with provocative analogies, examples, and metaphors. He suggests how an individual might pursue the quest for good design, but he does not offer a stock set of the answers.

During the past three decades Alexander and his colleagues and students at the Center for Environmental Structure at the University of California, Berkeley have conducted a series of "experiments" working to understand and demonstrate how to design cities which are not "trees." Alexander's writings since "A City Is Not a Tree" provide an abundance of specific principles and examples as well as many more unanswered questions and lines for exploration.

While Alexander is fascinated with physical form, his approach begins with an interactive process working with clients to understand their most fundamental needs. Profoundly respectful of the ideas of clients, Alexander's projects incorporate rammed earth and chicken wire into housing for Mexicali slum dwellers and Zen architectural details into a Japanese school. He and his followers seek architecture which is "alive"; architecture that possesses "the quality without a name."

Consider the relevance of J. B. Jackson's description of how the informal vernacular architecture of small U.S. towns meets human needs (p. 82) to Alexander's conviction that built environments that grow organically contain important lessons for planners. Alexander shares architectural critic Jane Jacobs's love of apparently chaotic, jumbled urban neighborhoods. Like Jacobs he sees a complex order and rationality behind an apparently disorderly facade. Consider Alexander's concept of a semi-lattice structure in relation to Jacobs's argument for designing streets to provide play space for children, security, and areas for human interaction as well as space for cars to drive (p. 104). A casual observer might consider the resulting street a confused and disorderly one. She might not see how it meets multiple, complex human needs. Alexander would like to help architects and planners design streets which achieve the positive qualities of lively streets in New York's Greenwich Village or Boston's West End before urban renewal tidied up (and deadened) the streetscape. Note also the similarity to British architect/planner Raymond Unwin's respect for natural cities and for urban forms shaped by the ideas of their residents (p. 355).

Alexander's theories are developed in a series of books published by Oxford University Press in New York: *The Oregon Experiment* (1975), *A Pattern Language* (1977), *The Timeless Way of Building* (1979), *The Linz Cafe* (1981), *The Production of Houses* (1985), and *A New Theory of Urban Design* (1987). An overview of his work by Ingrid F. King is "Christopher Alexander and Contemporary Architecture" in *Architecture and Urbanism* (August 1993).

## CHRISTOPHER ALEXANDER, "A City Is Not a Tree"

***Architectural Forum* (1965)**

The tree of my title is not a green tree with leaves. It is the name for a pattern of thought. The semi-lattice is the name for another, more complex, pattern of thought.

In order to relate these abstract patterns to the nature of the city, I must first make a simple distinction. I want to call those cities which have arisen more or less spontaneously over many, many years *natural cities*. And I shall call those cities and parts of cities which have been deliberately created by designers and planners *artificial cities*. Siena, Liverpool, Kyoto, Manhattan are examples of natural cities. Levittown, Chandigarh, and the British New Towns are examples of artificial cities.

It is more and more widely recognized today that there is some essential ingredient missing from artificial cities. When compared with ancient cities that have acquired the patina of life, our modern attempts to create cities artificially are, from a human point of view, entirely unsuccessful.

Architects themselves admit more and more freely that they really like living in old buildings more than new ones. The non-art-loving public at large, instead of being grateful to architects for what they do, regards the onset of modern buildings and modern cities everywhere as an inevitable, rather sad piece of the larger fact that the world is going to the dogs.

It is much too easy to say that these opinions represent only people's unwillingness to forget the past, and their determination to be traditional. For myself, I trust this conservatism. Americans are usually willing to move with the times. Their growing reluctance to accept the modern city evidently expresses a longing for some real thing, something which for the moment escapes our grasp.

The prospect that we may be turning the world into a place peopled only by little glass and concrete boxes has alarmed many architects too. To combat the glass box future, many valiant protests and designs have been put forward, all hoping to recreate in modern form the various characteristics of the natural city which seem to give it life. But so far these designs have only remade the old. They have not been able to create the new.

"Outrage," the *Architectural Review*'s campaign against the way in which new construction and telegraph poles are wrecking the English town, based its remedies, essentially, on the idea that the spatial sequence of buildings and open spaces must be controlled if scale is to be preserved – an idea that really derives from Camillo Sitte's book about ancient squares and piazzas.

Another kind of remedy, in protest against the monotony of Levittown, tries to recapture the richness of shape found in the houses of a natural old town. Llewelyn Davies's village at Rushbrooke in England is an example – each cottage is slightly different from its neighbor, the roofs jut in and out at picturesque angles.

A third suggested remedy is to get high density back into the city. The idea seems to be that if the whole metropolis could only be like Grand Central Station, with lots and lots of layers and tunnels all over the place, and enough people milling around in them, maybe it would be human again.

Another very brilliant critic of the deadness which is everywhere is Jane Jacobs. Her criticisms are excellent. But when you read her concrete proposals for what we should do instead, you get the idea that she wants the great modern city to be a sort of mixture between Greenwich Village and some Italian hill town, full of short blocks and people sitting in the street.

The problem the designers have tried to face is real. It is vital that we discover the property of old towns which gave them life and get it back into our own artificial cities. But we cannot do this merely by remaking English villages, Italian piazzas, and Grand Central Stations. Too many designers today seem to be yearning for the physical and plastic characteristics of the past, instead of searching for the abstract ordering principle which the towns of the past happened to have, and which our modern conceptions of the city have not yet found.

*What is the inner nature, the ordering principle, which distinguishes the artificial city from the natural city?*

You will have guessed from my title what I believe this ordering principle to be. I believe that a natural city has the organization of a semi-lattice; but that when we organize a city artificially, we organize it as a tree.

Both the tree and the semi-lattice are ways of thinking about how a large collection of many small systems goes to make up a large and complex system. More generally, they are both names for structures of sets.

In order to define such structures, let me first define the concept of a set. A set is a collection of elements which for some reason we think of as belonging together. Since, as designers, we are concerned with the physical living city and its physical backbone, we most naturally restrict ourselves to considering sets which are collections of material elements such as people, blades of grass, cars, bricks, molecules, houses, gardens, water pipes, the water molecules that run in them, etc.

When the elements of a set belong together because they cooperate or work together somehow, we call the set of elements a system.

For example, in Berkeley at the corner of Hearst and Euclid, there is a drugstore, and outside the drugstore a traffic light. In the entrance to the drugstore there is a newsrack where the day's papers are displayed. When the light is red, people who are waiting to cross the street stand idly by the light; and since they have nothing to do, they look at the papers displayed on the newsrack which they can see from where they stand. Some of them just read the headlines, others actually buy a paper while they wait.

This effect makes the newsrack and the traffic light interdependent; the newsrack, the newspapers on it, the money going from people's pockets to the dime slot, the people who stop at the light and read papers, the traffic light, the electric impulses which make the lights change, and the sidewalk which the people stand on form a system – they all work together.

From the designer's point of view, the physically unchanging part of this system is of special interest. The newsrack, the traffic light, and the sidewalk between them, related as they are, form the fixed part of the system. It is the unchanging receptacle in which the changing parts of the system – people, newspapers, money, and electrical impulses – can work together. I define this fixed part as a unit of the city. It derives its coherence as a unit both from the forces which hold its own elements together, and from the dynamic coherence of the larger living system which includes it as a fixed invariant part.

Of the many, many fixed concrete subsets of the city which are the receptacles for its systems, and can therefore be thought of as significant physical units, we usually single out a few for special consideration. In fact, I claim that whatever picture of the city someone has is defined precisely by the subsets he sees as units.

Now, a collection of subsets which goes to make up such a picture is not merely an amorphous collection. Automatically, merely because relationships are established among the subsets once the subsets are chosen, the collection has a definite structure.

To understand this structure, let us think abstractly for a moment, using numbers as symbols. Instead of talking about the real sets of millions of real particles which occur in the city, let us consider a simpler structure made of just half a dozen elements. Label these elements 1, 2, 3, 4, 5, 6. Not including the full set [1, 2, 3, 4, 5, 6], the empty set [–], and the one-element sets [1], [2], [3], [4], [5], [6], there are 56 different subsets we can pick from six elements.

Suppose we now pick out certain of these 56 sets (just as we pick out certain sets and call them units when we form our picture of the city). Let us say, for example, that we pick the following subsets: [123], [34], [45], [234], [345], [12345], [3456].

What are the possible relationships among these sets? Some sets will be entirely part of larger sets, as [34] is part of [345] and [3456]. Some of the sets will overlap, like [123] and [234]. Some of the sets will be disjoint – that is, contain no elements in common, like [123] and [45].

We can see these relationships displayed in two ways. In diagram A [Figure 1] each set chosen to be a unit has a line drawn round it. In diagram B the chosen sets are arranged in order of ascending magnitude, so that whenever one set contains another (as [345] contains [34]), there is a vertical path leading from one to the other. For the sake of clarity and visual economy, it is usual to draw lines only between sets which have no further sets and lines between them; thus the line between [34] and [345], and the line between [345] and [3456], make it unnecessary to draw a line between [34] and [3456].

As we see from these two representations, the choice of subsets alone endows the collection of subsets as a whole with an overall structure. This is the structure which we are concerned with here. When the structure meets certain conditions it is called a semi-lattice. When it meets other more restrictive conditions, it is called a tree.

The semi-lattice axiom goes like this: *A collection of sets forms a semi-lattice if and only if, when two overlapping sets belong to the collection, then the set of elements common to both also belongs to the collection.*

The structure illustrated in diagrams A and B is a semi-lattice. It satisfies the axiom since, for instance, [234] and [345] both belong to the collection, and their common part, [34], also belongs to it. (As far as the city is concerned, this axiom states merely that wherever two units overlap, the area of overlap is itself a recognizable entity and hence a unit also. In the case of the drugstore example, one unit consists of the newsrack, sidewalk, and traffic light. Another unit consists of the drug store itself, with its entry and the newsrack. The two units overlap in the newsrack. Clearly this area of overlap is itself a recognizable unit, and so satisfies the axiom above which defines the characteristics of a semi-lattice.)

The tree axiom states: *A collection of sets forms a tree if and only if, for any two sets that belong to the collection, either one is wholly contained in the other, or else they are wholly disjoint.*

The structure illustrated in diagrams C and D is a tree. Since this axiom excludes the possibility of overlapping sets, there is no way in which the semi-lattice axiom can be violated, so that every tree is a trivially simple semi-lattice.

However, in this paper we are not so much concerned with the fact that a tree happens to be a semi-lattice, but with the difference between trees and those more general semi-lattices which are *not* trees because they *do* contain overlapping units. We are concerned with the difference between structures in which no overlap occurs, and those structures in which overlap does occur.

It is not merely the overlap which makes the distinction between the two important. Still more important is the fact that the semi-lattice is potentially a much more complex and subtle structure than a tree. We may see just how much more complex a semi-lattice can be than a tree in the following fact: a tree based on 20 elements can contain at most 19 further subsets of the 20, while a semi-lattice based on the same 20 elements can contain more than 1,000,000 different subsets.

This enormously greater variety is an index of the great structural complexity a semi-lattice can have when compared with the structural simplicity of a tree. It is this lack of structural complexity, characteristic of trees, which is crippling our conceptions of the city.

To demonstrate, let us look at some modern conceptions of the city, each of which I shall show to be essentially a tree. It will perhaps be useful, while we look at these plans, to have a little ditty in our minds:

Big fleas have little fleas
Upon their back to bite 'em,
Little fleas have lesser fleas,
And so ad infinitum.

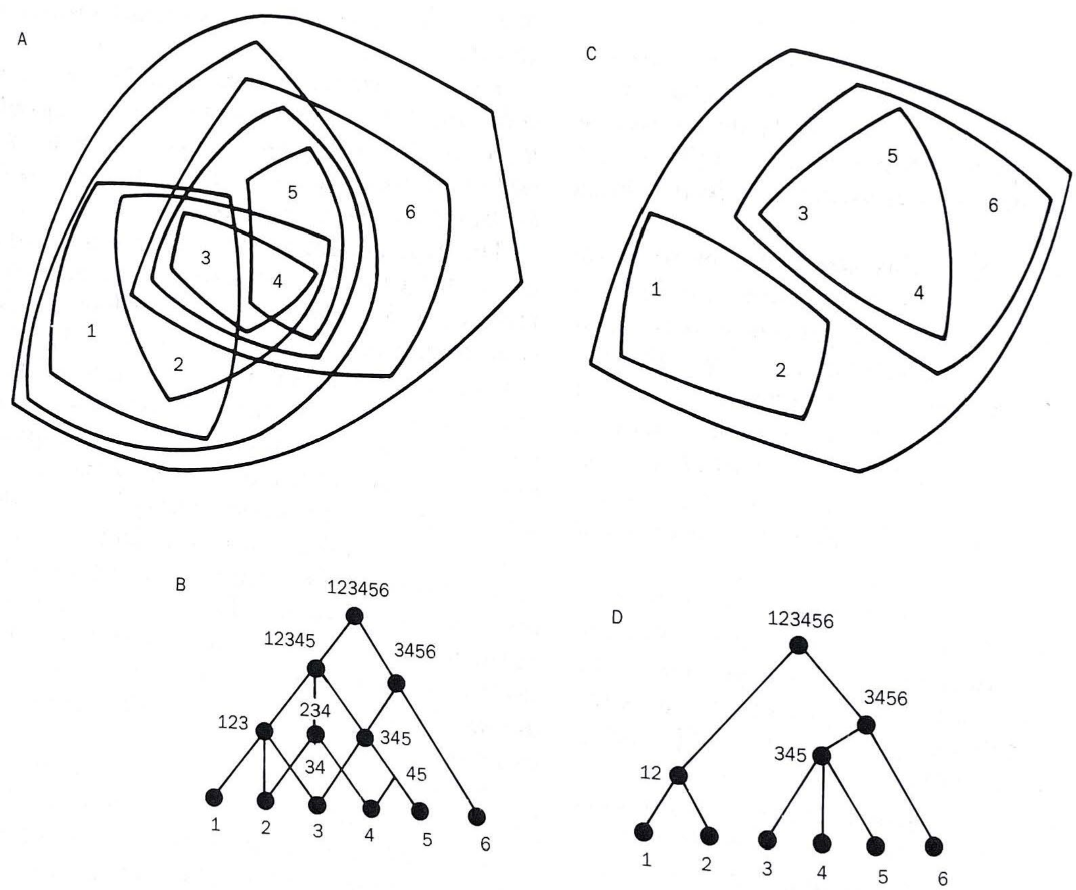



*Figure 1*

This rhyme expresses perfectly and succinctly the structural principle of the tree.

[Alexander discusses Columbia, Maryland, and seven other city plans by famous architects and planners: Greenbelt, Maryland (Clarence Stein), Greater London (Abercrombie and Forshaw), Tokyo (Kenzo Tange), Mesa City (Paolo Soleri), Chandigarh (Le Corbusier), Brasilia (Lucio Costa), and Communitas (Paul and Percival Goodman).]

The most beautiful example of all I have kept until last, because it symbolizes the problem perfectly. It appears in Hilberseimer's book called *The Nature of Cities*. He describes the fact that certain Roman towns had their origin as military camps, and then shows a picture of a modern military encampment as a kind of archetypal form for the city. It is not possible to have a structure which is a clearer tree.

The symbol is apt, for, of course, the organization of the army was created precisely in order to create discipline and rigidity. When a city is endowed with a tree structure, this is what happens to the city and its people. Hilberseimer's own scheme for the commercial area of a city is based on the army camp archetype.

Each of these structures, then, is a tree. Each unit in each tree that I have described, moreover, is the fixed, unchanging residue of some system in the living city (just as a house is the residue of the interactions between the members of a family, their emotions, and their belongings; and a freeway is the residue of movement and commercial exchange).

However, in every city there are thousands, even millions, of times as many more systems at work whose physical residue does not appear as a unit in these tree structures. In the worst cases, the units which do appear fail to correspond to any living reality; and the real systems, whose existence actually makes the city live, have been provided with no physical receptacle.

[...]

In a traditional society, if we ask a man to name his best friends and then ask each of these in turn to name their best friends, they will all name each other so that they form a closed group. A village is made of a number of separate closed groups of this kind.

But today's social structure is utterly different. If we ask a man to name his friends and then ask them in turn to name their friends, they will all name different people, very likely unknown to the first person; these people would again name others, and so on outwards. There are virtually no closed groups of people in modern society. The reality of today's social structure is thick with overlap – the systems

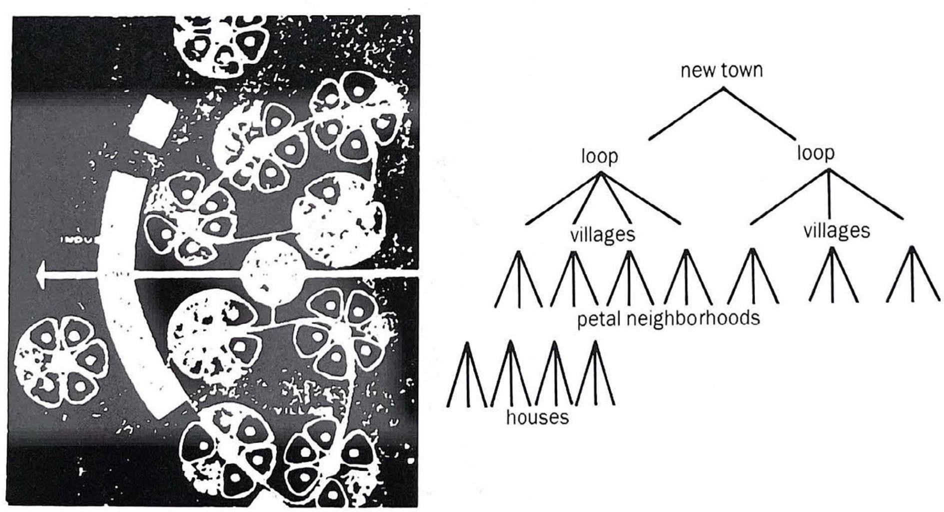



*Figure 2* Columbia, Maryland, Community Research and Development Inc.: Neighborhoods, in clusters of five, form "villages." Transportation joins the villages into a new town. The organization is a tree.

of friends and acquaintances form a semi-lattice, not a tree (Figure 3).

In the natural city, even the house on a long street (not in some little cluster) is a more accurate acknowledgement of the fact that your friends live not next door, but far away, and can only be reached by bus or automobile. In this respect Manhattan has more overlap in it than Greenbelt. And though one can argue that in Greenbelt too, friends are only minutes away by car, one must then ask: since certain groups *have* been emphasized by the physical units of the physical structure, why are just these the most irrelevant ones?

In the second part of this paper, I shall further demonstrate why the living city cannot be properly contained in a receptacle which is a tree – that indeed, its very life stems from the fact that it is not a tree.

Finally, I shall try to show that it is the process of thought itself which works in a treelike way, so that whenever a city is "thought out" instead of "grown," it is bound to get a treelike structure.

In the first part of this article, we saw that the units of which an artificial city is made up are organized to form a tree. So that we get a really clear understanding of what this means, and shall better see its implications, let us define a tree once again.

Whenever we have a tree structure, it means that within this structure no piece of any unit is ever connected to other units, except through the medium of that unit as a whole.

The enormity of this restriction is difficult to grasp. It is a little as though the members of a family were not free to make friends outside the family, except when the family as a whole made a friendship.

In simplicity of structure the tree is comparable to the compulsive desire for neatness and order that insists the candlesticks on a mantlepiece be perfectly straight and perfectly symmetrical about the center. The semi-lattice, by comparison, is the structure of a complex fabric; it is the structure of living things; of great paintings and symphonies.

It must be emphasized, lest the orderly mind shrink in horror from anything that is not clearly articulated and categorized in tree form, that the idea of overlap, ambiguity, multiplicity of aspect, and the semi-lattice, are not less orderly than the rigid tree, but more so. They represent a thicker, tougher, more subtle and

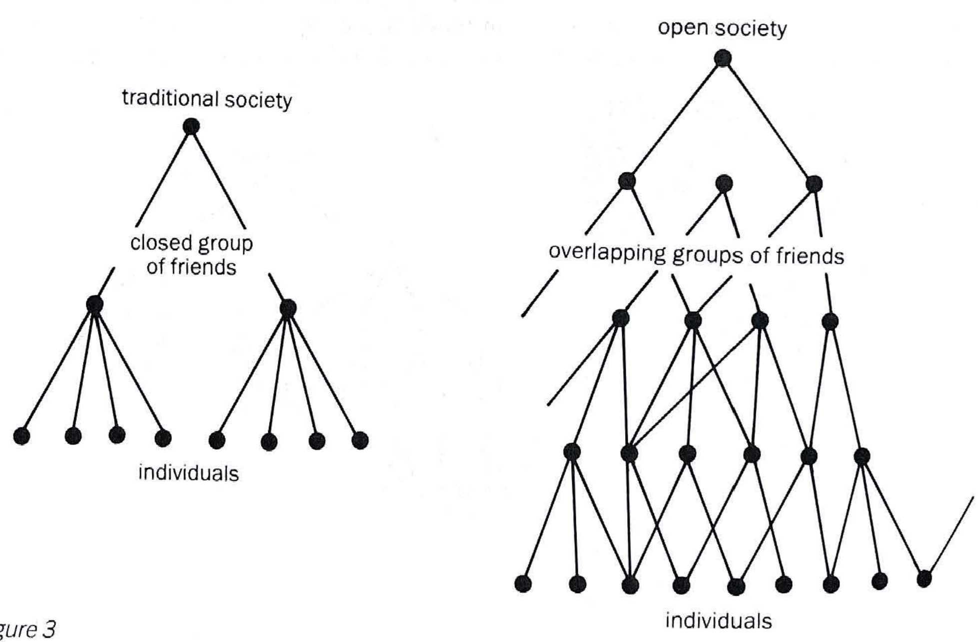



*Figure 3*

of friends and acquaintances form a semi-lattice, not a tree (Figure 3).

In the natural city, even the house on a long street (not in some little cluster) is a more accurate acknowledgement of the fact that your friends live not next door, but far away, and can only be reached by bus or automobile. In this respect Manhattan has more overlap in it than Greenbelt. And though one can argue that in Greenbelt too, friends are only minutes away by car, one must then ask: since certain groups *have* been emphasized by the physical units of the physical structure, why are just these the most irrelevant ones?

In the second part of this paper, I shall further demonstrate why the living city cannot be properly contained in a receptacle which is a tree – that indeed, its very life stems from the fact that it is not a tree.

Finally, I shall try to show that it is the process of thought itself which works in a treelike way, so that whenever a city is "thought out" instead of "grown," it is bound to get a treelike structure.

In the first part of this article, we saw that the units of which an artificial city is made up are organized to form a tree. So that we get a really clear understanding of what this means, and shall better see its implications, let us define a tree once again.

Whenever we have a tree structure, it means that within this structure no piece of any unit is ever connected to other units, except through the medium of that unit as a whole.

The enormity of this restriction is difficult to grasp. It is a little as though the members of a family were not free to make friends outside the family, except when the family as a whole made a friendship.

In simplicity of structure the tree is comparable to the compulsive desire for neatness and order that insists the candlesticks on a mantlepiece be perfectly straight and perfectly symmetrical about the center. The semi-lattice, by comparison, is the structure of a complex fabric; it is the structure of living things; of great paintings and symphonies.

It must be emphasized, lest the orderly mind shrink in horror from anything that is not clearly articulated and categorized in tree form, that the idea of overlap, ambiguity, multiplicity of aspect, and the semi-lattice, are not less orderly than the rigid tree, but more so. They represent a thicker, tougher, more subtle and

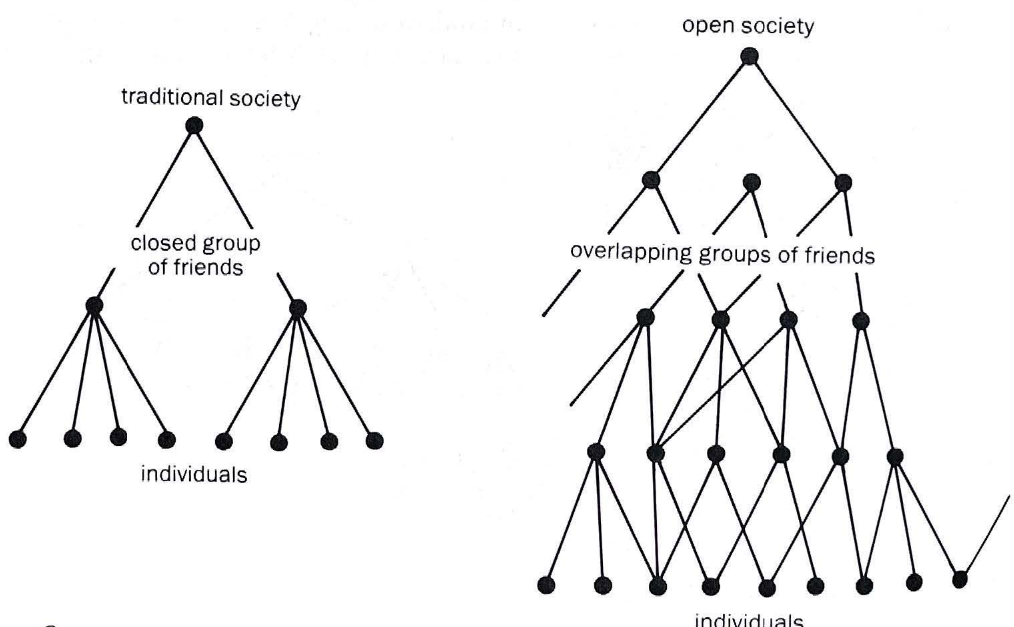



*Figure 3*

more complex view of structure.

Let us now look at the ways in which the natural, when unconstrained by artificial conceptions, shows itself to be a semi-lattice.

A major aspect of the city's social structure which a tree can never mirror properly is illustrated by Ruth Glass's redevelopment plan for Middlesborough, a city of 200,000 which she recommends be broken down into 29 separate neighborhoods. After picking her 29 neighborhoods by determining where the sharpest discontinuities of building type, income, and job type occur, she asks herself the question: "If we examine some of the social systems which actually exist for the people in such a neighborhood, do the physical units defined by these various social systems all define the same spatial neighborhood?" Her own answer to this question is *no*.

Each of the social systems she examines is a nodal system. It is made of some sort of central node, plus the people who use this center. Specifically she takes elementary schools, secondary schools, youth clubs, adult clubs, post offices, greengrocers', and grocers' selling sugar. Each of these centers draws its users from a certain spatial area or spatial unit. This spatial unit is the physical residue of the social system as a whole, and is therefore a unit in the terms of this paper. The units corresponding to different kinds of centers for the single neighborhood of Waterloo Road are shown in Figure 4. The hard outline is the boundary of the so-called neighborhood itself. The white circle stands for the youth club, and the small solid rings stand for areas where its members live. The ringed spot is the adult club, and the homes of its members form the unit marked by dashed boundaries. The white square is the post office and the dotted line marks the unit which contains its users. The secondary school is marked by the spot with a black triangle in it. Together with its pupils, it forms the system marked by the dot-dashed line.

As you can see at once, the different units do not coincide. Yet neither are they disjoint. They overlap.

We cannot get an adequate picture of what Middlesborough is, or of what it ought to be, in terms of 29 large and conveniently integral chunks called neighborhoods. When we describe the city in terms of neighborhoods, we implicitly assume that the smaller elements within any one of these neighborhoods belong together so tightly that they interact with elements in other neighborhoods only through the medium of the neighborhood to which they themselves belong. Ruth Glass herself shows clearly that this is not the case.

Below [Figure 5] are two pictures of the Waterloo neighborhood. For the sake of argument I have broken it into a number of small areas. [The left-hand diagram] shows how these pieces stick together in fact, and [the right-hand diagram] shows how the redevelopment plan pretends they stick together.

There is nothing in the nature of the various

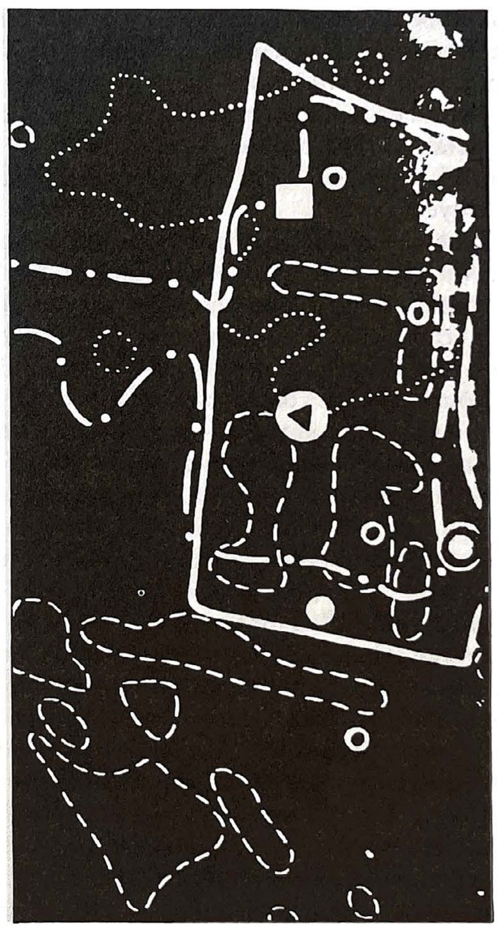


*Figure 4*

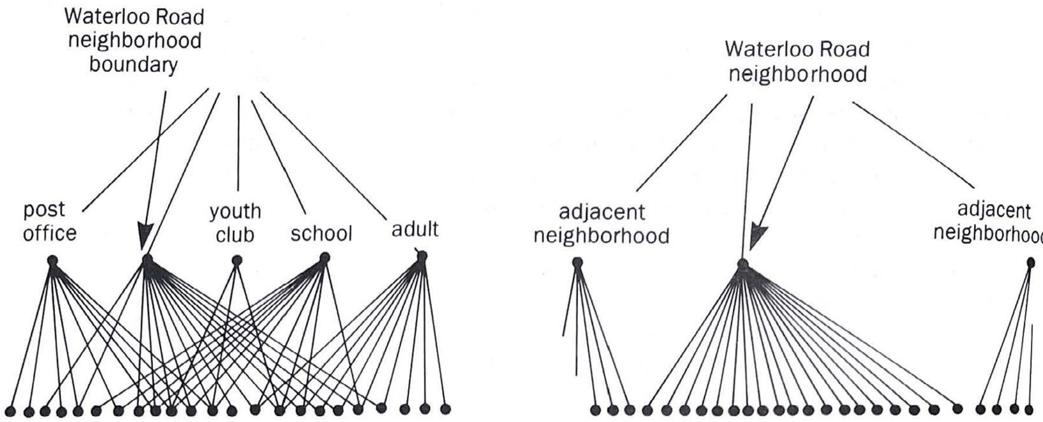



*Figure 5*

centers which says that their catchment areas should be the same. Their natures are different. Therefore the units they define are different. The natural city of Middlesborough was faithful to the semi-lattice structure they have. Only in the artificial tree conception of the city are their natural, proper, and necessary overlaps destroyed.

Take the separation of pedestrians from moving vehicles, a tree concept proposed by Le Corbusier, Louis Kahn, and many others. At a very crude level of thought this is obviously a good idea. It is dangerous to have 60-mile-an-hour cars in contact with little children toddling. But it is not *always* a good idea. There are times when the ecology of a situation actually demands the opposite. Imagine yourself coming out of a Fifth Avenue store; you have been shopping all afternoon; your arms are full of parcels; you need a drink; your wife is limping. Thank God for taxis.

Yet the urban taxi can function only because pedestrians and vehicles are not strictly separated. The prowling taxi needs a fast stream of traffic so that it can cover a large area to be sure of finding a passenger. The pedestrian needs to be able to hail the taxi from any point in the pedestrian world, and to be able to get out to any part of the pedestrian world to which he wants to go. The system which contains the taxicabs needs to overlap both the fast vehicular traffic system and the system of pedestrian circulation. In Manhattan pedestrians and vehicles do share certain parts of the city, and the necessary overlap is guaranteed . . .

Another favorite concept of the CIAM theorists and others is the separation of recreation from everything else. This has crystallized in our real cities in the form of playgrounds. The playground, asphalted and fenced in, is nothing but a pictorial acknowledgment of the fact that "play" exists as an isolated concept in our minds. It has nothing to do with the life of play itself. Few self-respecting children will even play in a playground.

Play itself, the play that children practice, goes on somewhere different every day. One day it may be indoors, another day in a friendly gas station, another day down by the river, another day in a derelict building, another day on a construction site which has been abandoned for the weekend. Each of these play activities, and the objects it requires, forms a system. It is not true that these systems exist in isolation, cut off from the other systems in the city. The different systems overlap one another, and they overlap many other systems besides. The units, the physical places recognized as play places, must do the same.

In a natural city this is what happens. Play takes place in a thousand places – it fills the interstices of adult life. As they play, children become full of their surroundings. How can a child become filled with his surroundings in a fenced enclosure? He cannot.

A similar kind of mistake occurs in trees like that of Goodman's Communitas, or Soleri's Mesa City, which separate the university from the rest of the city. Again, this has actually been realized in common American form of the isolated campus.

What is the reason for drawing a line in the city so that everything within the boundary is university, and everything outside is non-university? It is conceptually clear. But does it correspond to the realities of university life? Certainly it is not the structure which occurs in non-artificial university cities.

Take Cambridge University, for instance. At certain points Trinity Street is physically almost indistinguishable from Trinity College. One pedestrian crossover in the street is literally part of the college. The buildings on the street, though they contain stores and coffee shops and banks at ground level, contain undergraduates' rooms in their upper stories. In many cases the actual fabric of the street buildings melts into the fabric of the old college buildings so that one cannot be altered without the other.

There will always be many systems of activity where university life and city life overlap: pub-crawling, coffee-drinking, the movies, walking from place to place. In some cases whole departments may be actively involved in the life of the city's inhabitants (the hospital-cum-medical school is an example). In Cambridge, a natural city where university and city have grown together gradually, the physical units overlap because they are the physical residues of city systems and university systems which overlap (Figure 6).

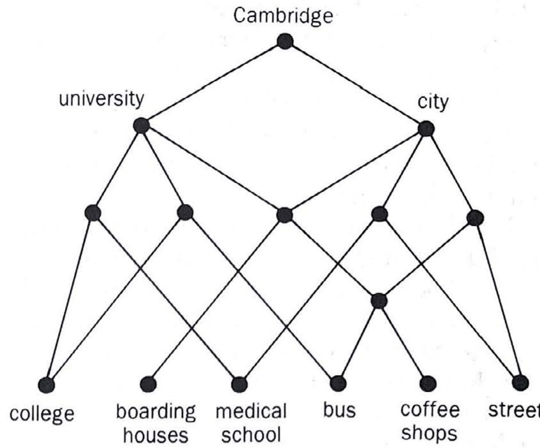


*Figure 6*

Let us look next at the hierarchy of urban cores, realized in Brasilia, Chandigarh, the MARS plan for London, and, most recently, in the Manhattan Lincoln Center, where various performing arts serving the population of greater New York have been gathered together to form just one core.

Does a concert hall ask to be next to an Opera House? Can the two feed on one another? Will anybody ever visit them both, gluttonously, in a single evening, or even buy tickets from one after going to a concert in the other? In Vienna, London, Paris, each of the performing arts has found its own place, because all are not mixed randomly. Each has created its own familiar section of the city. In Manhattan itself, Carnegie Hall and the Metropolitan Opera House were not built side by side. Each found its own place, and now creates its own atmosphere. The influence of each overlaps the parts of the city which have been made unique to it.

The only reason that these functions have all been brought together in the Lincoln Center is that the concept of performing art links them to one another.

But this tree, and the idea of a single hierarchy of urban cores which is its parent, do not illuminate the relations between art and city life. They are merely born of the mania every simple-minded person has for putting things with the same name into the same basket.

The total separation of work from housing, started by Tony Garnier in his industrial city, then incorporated in the 1929 Athens Charter, is now found in every artificial city and accepted everywhere where zoning is enforced. Is this a sound principle? It is easy to see how bad conditions at the beginning of the century prompted planners to try to get the dirty factories out of residential areas. But the separation misses a variety of systems which require, for their sustenance, little parts of both.

Jane Jacobs describes the growth of backyard industries in Brooklyn. A man who wants to start a small business needs space, which he is very likely to have in his own backyard. He also needs to establish connections with larger going enterprises and with their customers. This means that the system of backyard industry needs to belong both to the residential zone, and to the industrial zone – these zones need to overlap. In Brooklyn they do . . . In a city which is a tree, they can't.

Finally, let us examine the subdivision of the city into isolated communities. As we have seen in the Abercrombie plan for London, this is itself a tree structure. The individual community in a greater city has no reality as a functioning unit. In London, as in any great city, almost no one manages to find work which suits him near his home. People in one community work in a factory which is very likely to be in another community.

There are, therefore, many hundreds of thousands of worker–workplace systems, each consisting of a man plus the factory he works in, which cut across the boundaries defined by Abercrombie's tree. The existence of these units, and their overlapping nature, indicates that the living systems of London form a semi-lattice. Only in the planner's mind has it become a tree.

The fact that we have so far failed to give this any physical expression has a vital consequence. As things are, whenever the worker and his workplace belong to separately administered municipalities, the community which contains the workplace collects huge taxes and has relatively little on which to spend the tax revenue. The community where the worker lives, if it is mainly residential, collects only little in the way of taxes, and yet has great additional burdens on its purse in the shape of schools, hospitals, etc. Clearly, to resolve this inequity, the worker–workplace systems must be anchored in physically recognizable units of the city which can then be taxed.

[. . .]

Now, why is it that so many designers have conceived cities as trees when the natural structure is in every case a semi-lattice? Have they done so deliberately, in the belief that a tree structure will serve the people of the city better? Or have they done it because they cannot help it, because they are trapped by a mental habit, perhaps even trapped by the way the mind works; because they cannot encompass the complexity of a semi-lattice in any convenient mental form; because the mind has an overwhelming predisposition to see trees wherever it looks and cannot escape the tree conception?

I shall try to convince you that it is for this second reason that trees are being proposed and built as cities – that it is because designers, limited as they must be by the capacity of the mind to form intuitively accessible structures, cannot achieve the complexity of the semi-lattice in a single mental act.

Let me begin with an example.

Suppose I ask you to remember the following four objects: an orange, a watermelon, a football, and a tennis ball. How will you keep them in your mind, in your mind's eyes? However you do it, you will do it by grouping them. Some of you will take the two fruits together, the orange and the watermelon, and the two sports balls together, the football and the tennis ball. Those of you who tend to think in terms of physical shape may group them differently, taking the two small spheres together – the orange and the tennis ball – and the two larger and more egg-shaped objects – the watermelon and the football. Some of you will be aware of both.

Let us make a diagram of these groupings (Figure 7).

Either grouping taken by itself is a tree structure. The two together are a semi-lattice. Now let us try to visualize these groupings in the mind's eye. I think you will find that you cannot visualize all four sets simultaneously – because they overlap. You can visualize one pair of sets and then the other, and you can alternate between the two pairs extremely fast, so fast that you may deceive yourself into thinking you can visualize them all together. But in truth, you cannot conceive all four sets at once in a single mental act. You cannot bring the semi-lattice structure into a visualizable form for a single mental act. In a single mental act you can only visualize a tree.

This is the problem we face as designers. While we are not, perhaps, necessarily occupied with the problem of total visualization as a single mental act the principle is still the same.

The tree is accessible mentally, and easy to deal with. The semi-lattice is hard to keep before the mind's eye, and therefore hard to deal with.

It is known today that grouping and categorization are among the most primitive psychological processes. Modern psychology treats thought as a process of fitting new situations into existing slots and pigeonholes in the mind. Just as you cannot put a physical thing into more than one physical pigeonhole at once, so, by analogy, the processes of thought prevent you from putting a mental construct into more than one mental category at once. Study of the origin of these processes suggests that they stem essentially from the organism's need to read the complexity of its environment by establishing barriers between the different events which it encounters.

It is for this reason – because the mind's first function is to reduce the ambiguity and overlap in a confusing situation, and because to this end it is endowed with a basic intolerance for ambiguity – that structures like the city, which do require overlapping sets within them, are nevertheless persistently conceived as trees.

[. . .]

You are no doubt wondering, by now, what a city looks like which is a semi-lattice, but not a tree. I must confess that I cannot yet show you plans or sketches. It is not enough merely to make a demonstration of overlap – the overlap must be the right overlap. This is doubly important, because it is so tempting to make plans in which overlap occurs for its own sake. This is essentially what the high-density "life-filled" city plans of recent years do. But overlap alone does not give structure. It can also give chaos. A garbage can is full of overlap. To have structure, you must have

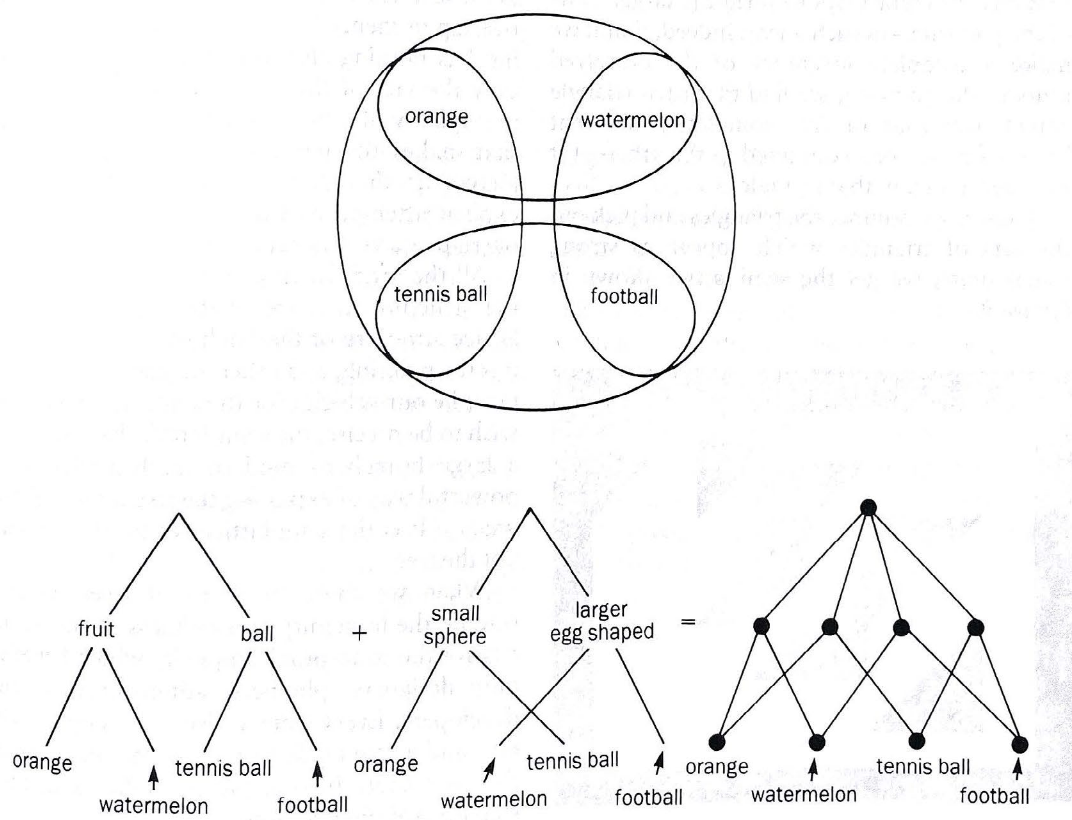



*Figure 7*

the right overlap, and this is for us almost certainly different from the old overlap which we observe in historic cities. As the relationships between functions change, so the systems which need to overlap in order to receive these relationships must also change. The re-creation of old kinds of overlap will be inappropriate, and chaotic instead of structured.

The work of trying to understand just what overlap the modern city requires, and trying to put this required overlap into physical and plastic terms, is still going on. Until the work is complete, there is no point in presenting facile sketches of ill thought out structure.

However, I can perhaps make the physical consequences of overlap more comprehensible by means of an image. The painting illustrated is a ... work by Simon Nicholson (Figure 8). The fascination of this painting lies in the fact that although it is constructed of rather few simple triangular elements, these elements unite in many different ways to form the larger units of the painting – in such a way, indeed, that if we make a complete inventory of the perceived units in the painting, we find that each triangle enters into four or five completely different kinds of unit, none contained in the others, yet all overlapping in that triangle.

Thus, if we number the triangles and pick out the sets of triangles which appear as strong visual units, we get the semi-lattice shown in Figure 9.

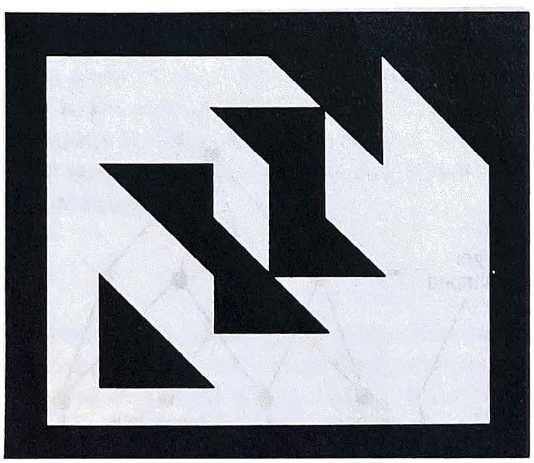


*Figure 8*

[Triangles] 3 and 5 form a unit because they work together as a rectangle; 2 and 4 because they form a parallelogram; 5 and 6 because they are both dark and pointing the same way; 6 and 7 because one is the ghost of the other shifted sideways; 4 and 7 because they are symmetrical with one another; 4 and 6 because they form another rectangle; 4 and 5 because they form a sort of Z; 2 and 3 because they form a rather thinner kind of Z; 1 and 7 because they are at opposite corners; 1 and 2 because they are a rectangle; 3 and 4 because they point the same way as 5 and 6, and form a sort of off-center reflection; 3 and 6 because they enclose 4 and 5; 1 and 5 because they enclose 2, 3, and 4. I have only listed the units of two triangles. The larger units are even more complex. The white is more complex still, and is not even included in the diagram because it is harder to be sure of its elementary pieces.

The painting is significant, not so much because it has overlap in it (many paintings have overlap in them), but rather because this painting has nothing else in it except overlap. It is only the fact of the overlap, and the resulting multiplicity of aspects which the forms present, that makes the painting fascinating. It seems almost as though the painter had made an explicit attempt, as I have done, to single out overlap as a vital generator of structures.

All the artificial cities I have described have the structure of a tree rather than the semi-lattice structure of the Nicholson painting. Yet it is the painting, and other images like it, which must be our vehicles for thought. And when we wish to be precise, the semi-lattice, being part of a large branch of modern mathematics, is a powerful way of exploring the structure of these images. It is the semi-lattice we must look for, not the tree.

When we think in terms of trees we are trading the humanity and richness of the living city for the conceptual simplicity which benefits only designers, planners, administrators and developers. Every time a piece of a city is torn out, and a tree made to replace the semi-lattice that was there before, the city takes a further step toward dissociation.

In any organized object, extreme compartmentalization and the dissociation of internal

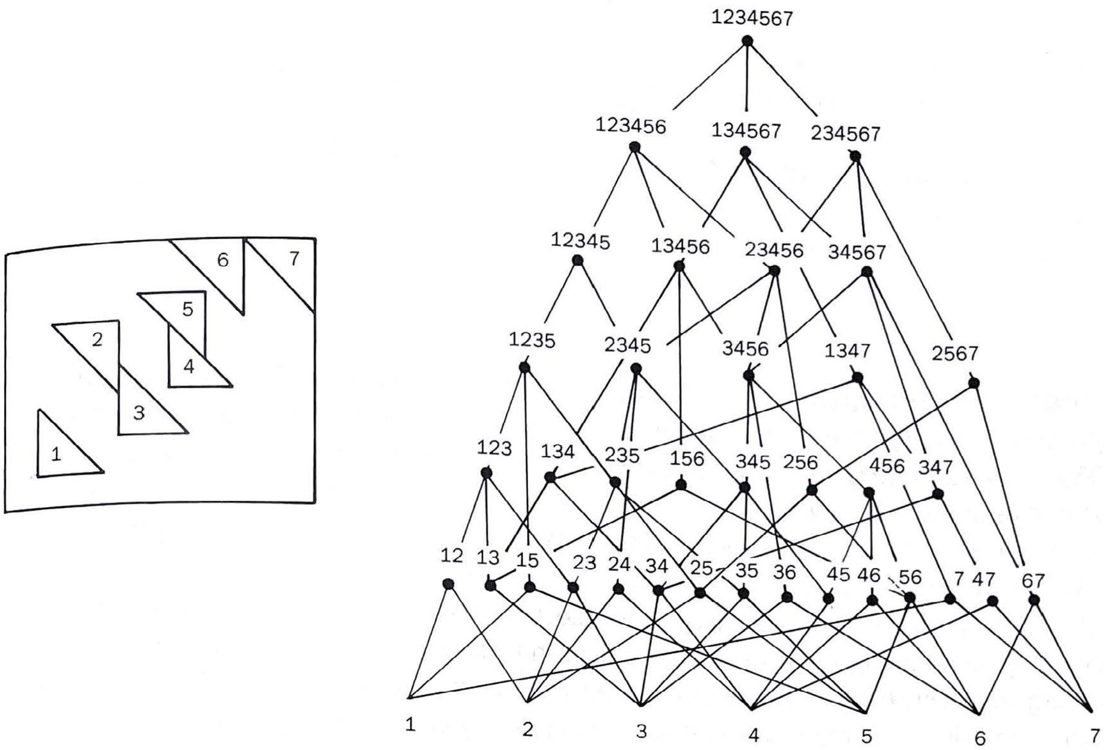



*Figure 9*

elements are the first signs of coming destruction. In a society, dissociation is anarchy. In a person, dissociation is the mark of schizophrenia and impending suicide. An ominous example of a city-wide dissociation is the separation of retired people from the rest of urban life, caused by the growth of desert cities for the old such as Sun City, Arizona. This separation is possible only under the influence of tree-like thought.

It not only takes from the young the company of those who have lived long, but, worse, causes the same rift inside each individual life. As you will pass into Sun City, and into old age, your ties with your own past will be unacknowledged, lost, and therefore broken. Your youth will no longer be alive in your old age – the two will be dissociated, your own life will be cut in two.

For the human mind, the tree is the easiest vehicle for complex thoughts. But the city is not, cannot, and must not be a tree. The city is a receptacle for life. If the receptacle severs the overlap of the strands of life within it, because it is a tree, it will be like a bowl full of razor blades on edge, ready to cut up whatever is entrusted to it. In such a receptacle life will be cut to pieces. If we make cities which are trees, they will cut our life within to pieces.

23 October 1970, Volume 170, Number 3956 SCIENCE

# Ekistics, the Science of Human Settlements

Ekistics starts with the premise that human settlements are susceptible of systematic investigation.

Constantinos A. Doxiadis

We cannot acquire proper knowledge about our villages, towns, and cities unless we manage to see the whole range of the man-made systems within which we live, from the most primitive to the most developed ones—that is, the whole range of human settlements. This is as necessary as an understanding of animals in general is to an understanding of mammals—perhaps even more so. Our subject, the whole range of human settlements, is a very complex system of five elements—nature, man, society, shells (that is, buildings), and networks. It is a system of natural, social, and man-made elements which can be seen in many ways—economic, social, political, technological, and cultural. For this reason only the widest possible view can help us to understand it.

There is a need for a science dealing with human settlements, because otherwise we cannot view these settlements in a reasonable way. Is such a science possible? The answer can be given in two ways. First, by observing that, in some periods of the past, people must have had such a science, which was probably written down only in ancient Greek times (in documents which have since been lost) and in Roman times (perhaps by the architect and engineer Vitruvius). Otherwise, how did people create cities that we still admire? Second, we are now convinced that man, in creating his settlements, obeys general principles and laws whose validity can be demonstrated. These principles and laws are actually an extension of man's biological characteristics, and in this respect we are dealing with a biology of larger systems.

It can be argued perhaps that we are dealing with a phenomenon with a ridiculously short life—some tens of thousands of years, as compared with billions of years for the phenomena of microbiology and even longer periods for the phenomena of chemistry and physics. However, there is no way of proving that a certain period is too short, or long enough, for the development of principles and laws. In this case it is long enough to convince us of certain truths.

To achieve the needed knowledge and develop the science of human settlements we must move from an interdisciplinary to a condisciplinary science; making links between disciplines is not enough. If we have one subject we need one science, and this is what ekistics, the science of human settlements, has tried to achieve. Has it succeeded? The answer is that it is beginning to succeed, and that with every day that passes we learn more and more. How far have we come? How can we answer this question for any road we take if we know only the beginning and not the end?

In this article I try to demonstrate through a few examples the need for, and the existence of, a huge field of knowledge which man is trying to regain and develop in a systematic way. This field is a science, even if in our times it is usually considered a technology and an art, without the foundations of a science—a mistake for which we pay very heavily. As I cannot present the whole case in a short article, I have selected a few points which can illustrate the validity of my statements made at the beginning of this article and the practical importance of this effort to achieve a science of human settlements.

## The Principles

In shaping his settlements man has always acted in obedience to five principles. As far as I know this has always been true, and I myself have not found any cases which prove the opposite.

The first principle is maximization of man's potential contacts with the elements of nature (such as water and trees), with other people, and with the works of man (such as buildings and roads). This, after all, amounts to an operational definition of personal human freedom. It is in accordance with this principle that man abandoned the Garden of Eden and is today attempting to conquer the cosmos. It is because of this principle that man considers himself imprisoned, even if given the best type of environment, if he is surrounded by a wall without doors. In this, man differs from animals; we do not know of any species of animals that try to increase their potential contacts with the environment once they have reached the optimum number of contacts. Man alone always seeks to increase his contacts.

The second principle is minimization of the effort required for the achievement of man's actual and potential contacts. He always gives his structures the shape, or selects the route, that requires the minimum effort, no matter whether he is dealing with the floor of a room, which he tends to make horizontal, or with the creation of a highway.

The third principle is optimization of man's protective space, which means

The author is an architect-planner and president of Doxiadis Associates, Athens, Greece, and Washington, D.C.

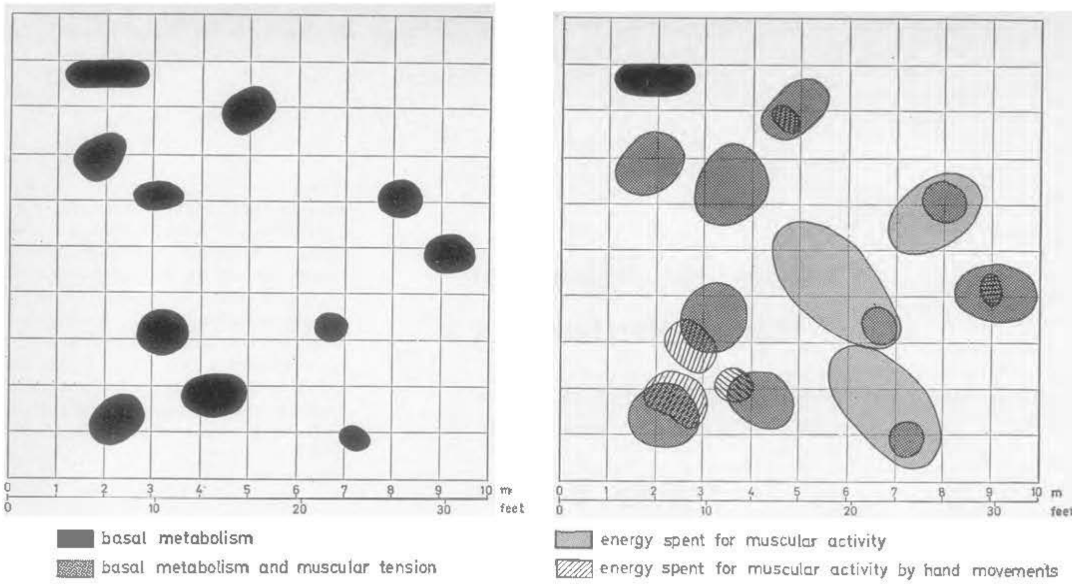



Fig. 1. (Left) Static picture of a group of people as given in plans. (Right) The real picture of the same group as given by energy measurements.

the selection of such a distance from other persons, animals, or objects that he can keep his contacts with them (first principle) without any kind of sensory or psychological discomfort. This has to be true at every moment and in every locality, whether it is temporary or permanent and whether man is alone or part of a group. This has been demonstrated very well, lately, for the single individual, by anthropologists such as E. T. Hall (*1*) and psychiatrists such as Augustus F. Kinzel (*2*), and by the clothes man designs for himself, and it may be explained not only as a psychological but also as a physiological problem if we think of the layers of air that surround us (*3*) or the energy that we represent (Fig. 1). The walls of houses or fortification walls around cities are other expressions of this third principle.

The fourth principle is optimization of the quality of man's relationship with his environment, which consists of nature, society, shells (buildings and houses of all sorts), and networks (ranging from roads to telecommunications) (Fig. 2). This is the principle that leads to order, physiological and esthetic, and that influences architecture and, in many respects, art.

Finally, and this is the fifth principle, man organizes his settlements in an attempt to achieve an optimum synthesis of the other four principles, and this optimization is dependent on time and space, on actual conditions, and on man's ability to create a synthesis. When he has achieved this by creating a system of floors, walls, roofs, doors, and windows which allows him to maximize his potential contacts (first principle) while minimizing the energy expended (second principle) and at the same time makes possible his separation from others (third principle) and the desirable relationship with his environment (fourth principle), we speak of "successful human settlements." What we mean is settlements that have achieved a balance between man and his man-made environment, by complying with all five principles.

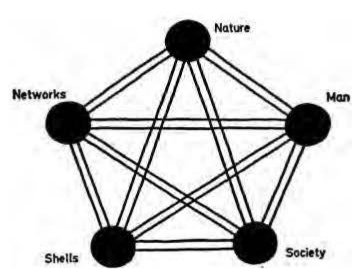
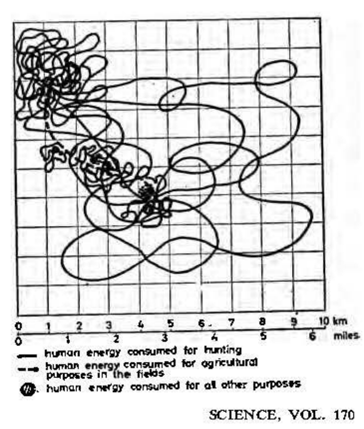


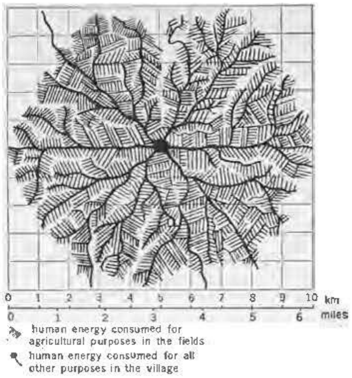

Fig. 2 (above). Fourth principle: optimization of the quality of man's relationship with his environment.

Fig. 3 (right). Energy model for hunters who begin to cultivate the land. Daily per capita energy consumption, 3000 calories.

## The Extent of Human Settlements

Each one of us can understand that he is guided by the same five principles; but we are not aware of their great importance unless this is pointed out to us, and we make great mistakes in our theories about human settlements. This is because we live in a transitional era and become confused about our subject, even about the nature and extent of





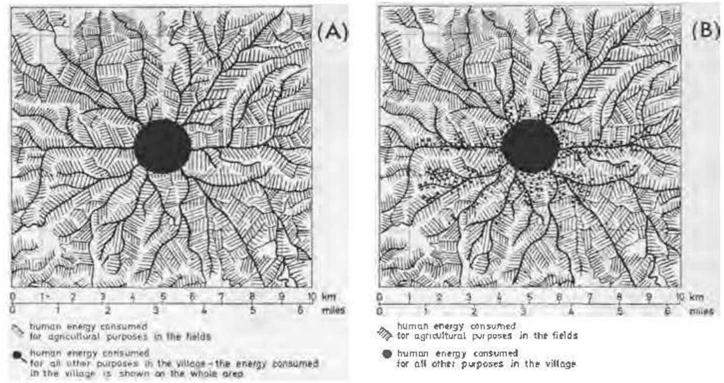




Fig. 4 (left). Energy model of a village. Daily per capita energy consumption, 8000 calories. Fig. 5 (middle and right). (A) Energy model of the central settlement of a system of villages. Daily per capita energy consumption, 12,000 calories. (B) Energy model of the central settlement of a system of villages during the era of the automobile. Daily per capita energy consumption, 25,000 calories.

human settlements, confusing them with their physical structure ("the built-up area is the city") or their institutional frame ("the municipality is the city"). But human settlements have always been created by man's moving in space and defining the boundaries of his territorial interest and therefore of his settlements, for which he later created a physical and institutional structure.

When we view human settlements as systems of energy mobilized by man—either as basal metabolic or as muscular or, recently, as commercial energy systems—we get new insights. We see man spreading his energy thin in the nomadic phase of his history (Fig. 3), then concentrating in one area and using both energy and rational patterns when he organizes his village, where he spends more energy in the built-up part than in the fields (Fig. 4). Later we see him concentrating in the small city and using a wider built-up area, where he expends even more energy, and then, when more people are added, we see him spreading beyond into the fields (Fig. 5). Finally, when he has commercial forms of energy available and can dispose much more energy without properly understanding its impact on his life and therefore without controlling its relationship to his settlement, man becomes completely confused by his desire for more energy. He suffers because, through ignorance, he inserts this additional energy into the system that he creates in a way that causes problems such as air and thermal pollution (Fig. 6).

Throughout this evolution there is only one factor which defines the extent of human settlements: the distance man wants to go or can go in the course of his daily life. The shortest of the two distances defines the extent of the real human settlement, through definition of a "daily urban system" [for a discussion of this process in urban settlements see "Man's movement and his city" (*4*)].

In each specific case, the process starts with the circle whose radius is defined by man's willingness to walk daily up to a certain distance and to spend up to a certain period of time in doing so (the limit for the rural dweller is 1 hour, or 5 kilometers, for horizontal movement; the limit for the urban dweller is 10 minutes, or 1 kilom-

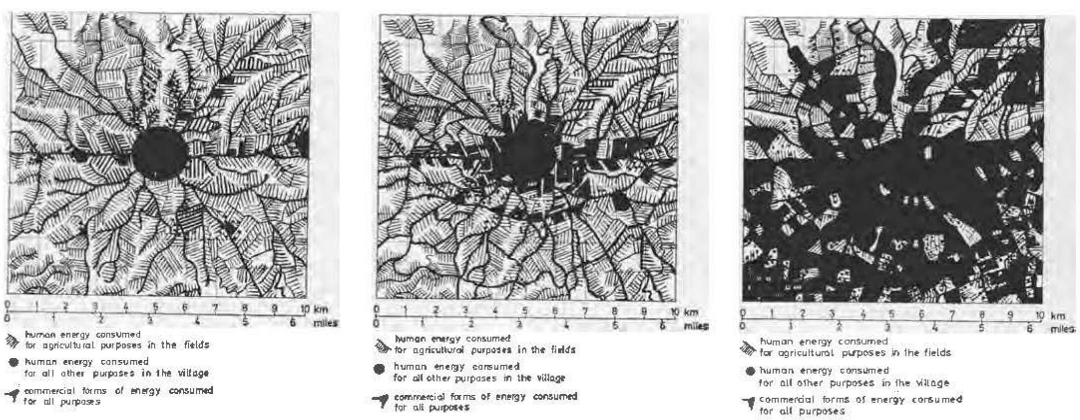



Fig. 6. Energy models of the central settlement of a system of villages during the era of the automobile and of industry. Daily per capita energy consumption, (left) 33,000 calories; (middle) 45,000 calories; (right) 100,000 calories.

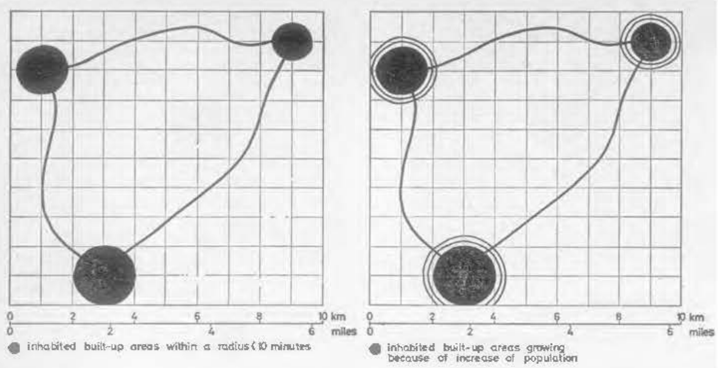



Fig. 7. Growth of a system, pedestrian kinetic fields only. (Left) Phase A; (right) phase B.

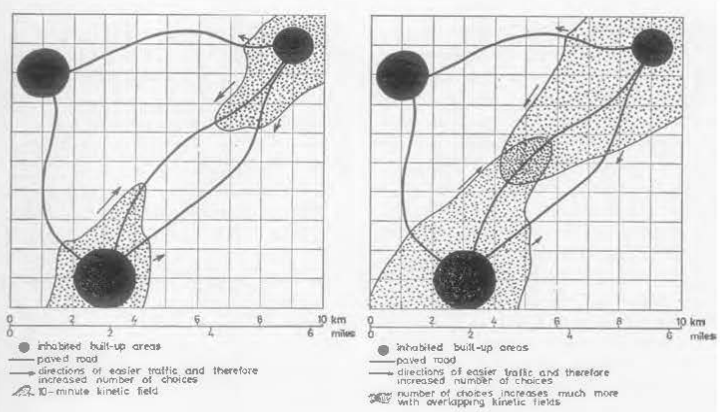



Fig. 8. Growth of a system, pedestrian and mechanical kinetic fields. (Left) Phase C; (right) phase D.

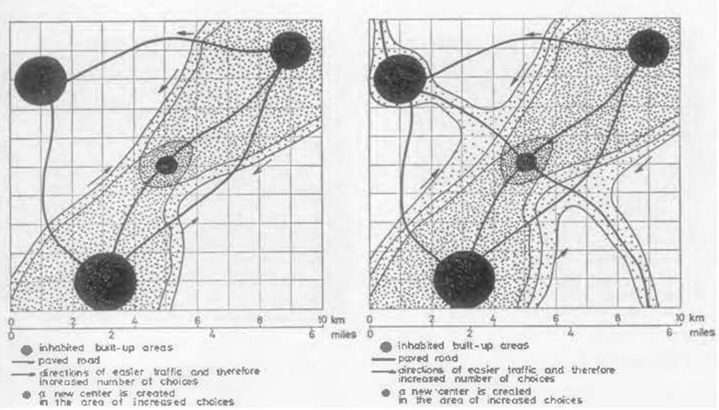



**Fig. 9. Growth of a system: pedestrian and mechanical kinetic fields. (Left) Phase E; (right) phase F.**

eter). This leads to the conception of a circular city, and of a city growing in concentric circles (Fig. 7). When the machine—for example, the motor vehicle—enters the picture we are gradually led toward a two-speed system (Fig. 8), and then toward interconnected settlements (Fig. 9); then the road toward larger systems and the universal City of Ecumenopolis is inevitable (*5*).

The idea that the small, romantic city of earlier times is appropriate to the era of contemporary man who developed science and technology is therefore a mistaken one. New, dynamic types of settlements interconnecting more and more smaller settlements are the types appropriate to this era. To stop this change from city (polis) to dynapolis (*6*), we would have to reverse the road created by science and technology for man's movement in terrestrial space.

### Classification by Size

The changing dimensions of human settlements and the change in their character from static to dynamic, which gives them different aspects with every day that passes, makes the settlements confusing places in which to live, and people, instead of facing this new problem with realism, start trying to escape from the confusion. Some mistakenly support the utopian thought of returning to the system of the small city, but they do not define how this can be achieved without loss of some of the advantages that the great city has given us. Others, feeling that they cannot return to the small-city system, support the big-city concept but do not dare to face the big city's real structure; this is the attitude that leads to dystopia (*7*)—to the big city that lacks quality. But there is another road: to realize that the big city is an inevitable phenomenon, but that the quality of life within it is bad, and to try to improve the quality of that life. This is the only desirable and realistic road.

To discuss quality of life or any other important phenomenon in human settlements without referring to their size is impossible. The confusion caused by the use of terms such as *small* and *big*, *town* and *metropolis*, *city* and *megalopolis* is very great. If we want to avoid it, we must classify all human settlements by size in order to be able to understand them and assign them values. A small neighborhood with cars running through it loses its values, and

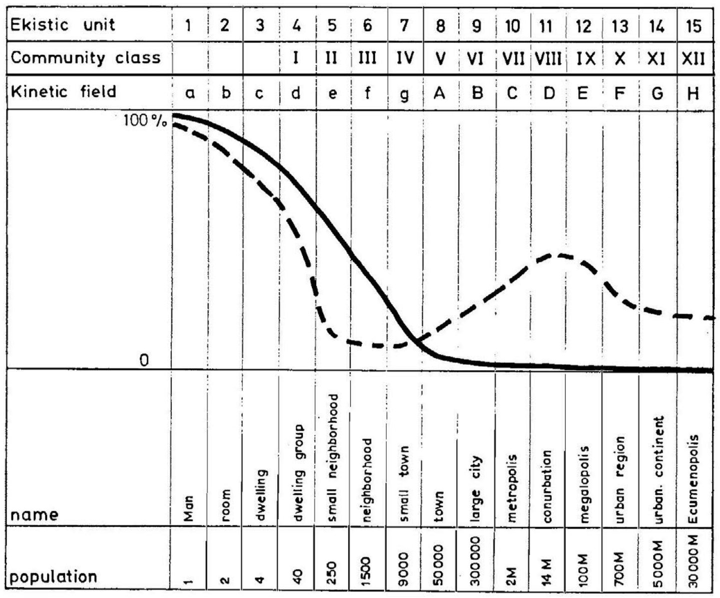



Fig. 10 (left). Contacts in the past and present in every ekistic unit. (Solid line) Past contacts, very much reduced beyond the unit of the town. (Dashed line) Present contacts. The greatest reduction is often in the small units.

a metropolis without means of very fast transportation cannot operate.

To achieve a proper classification, by sizes, of all human settlements, we should start with the smallest units. The smallest one is man himself as an individual. This spatial unit includes the individual, his clothing, and certain furniture, like his chair. The second unit is also very well defined; it is the space which belongs to him alone, or is shared under certain circumstances with a few others—that is, his personal room. The third unit, the family home, is well defined also, as long as we have families. The fourth unit is a group of homes which corresponds to the patriarchal home of earlier days and probably to the unit of the extended family of our day; this is the unit that children need most, mothers need mainly because of the children, and fathers need, if perhaps not directly for themselves, because they are interested in the satisfaction and happiness of both mother and children. I have defined four units; of these the first three are very clearly defined, physically and socially, and the fourth can be conceived of as a social unit.

Beyond this point we do not have a clear-cut definition of any unit until we reach the largest one possible on this earth—that is, the systems of human settlements of the whole planet. Thus we have five basic units, four at one extreme of our scale and one at the other. No other well-defined unit exists today, except for statistically defined units which are arbitrary, as may be seen from the differences in the official definitions from country to country. If we turn back in history we find, however, that, throughout the long evolution of human settlements, people in all parts of the world tended to build an urban settlement which reached an optimum size of 50,000 people and physical dimensions such that everyone was within a 10-minute distance from the center (*4*). There is no question that, for people who depend on walking as a means of locomotion, this unit is the optimum one from the point of view

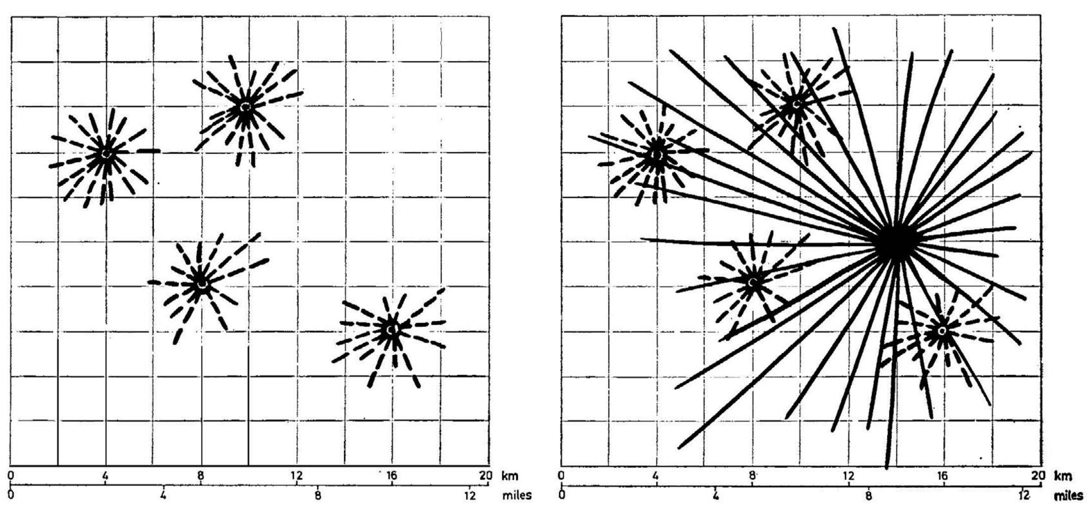
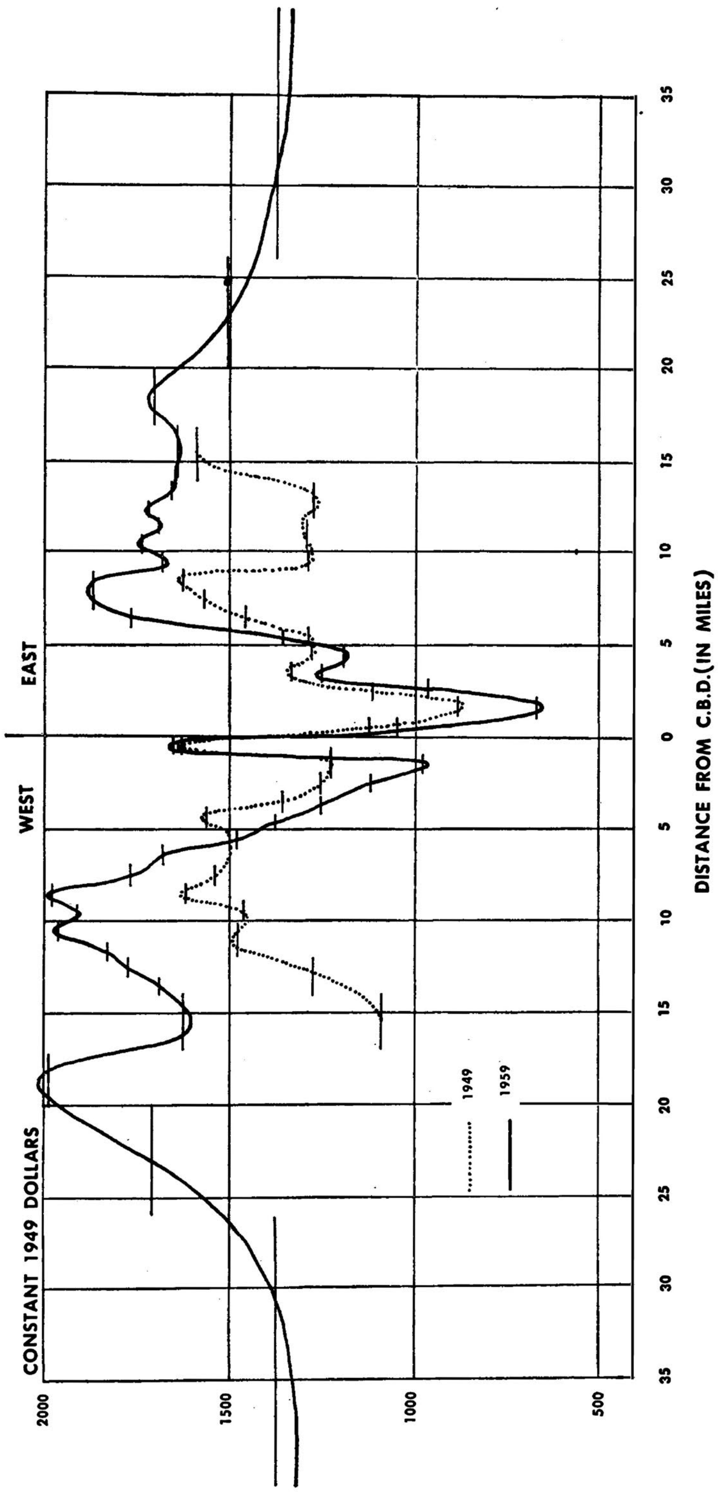



Fig. 11. Freedom for contacts in space. In the past (left) everyone had the same opportunities in his small world; now (right) some people have the choice of all contacts while others have very limited choices.




of movement and social interaction through direct contacts between people. Also, experience has shown that, for people who walk, it is a maximum one from the standpoint of esthetics; for example, creation of the Place de la Concorde in Paris cut from the total 3500-meter length of the Champs Elysées a length of 2100 meters, a distance from which one can reach, and enjoy, the Arc de Triomphe on foot. It is also perhaps an optimum one from the social point of view; for example, Pericles in ancient Athens could get a reasonable sample of public opinion by meeting 100 to 150 people while walking from his home to the Assembly.

Thus we now have four units at the beginning of the scale, one larger one somewhere beyond them, and one at the end—a total of six. How can we complete the scale?

This can be achieved, for example, if we think of units of space measured by their surface and increase their size by multiplying them by 7. Such a coefficient is based on the theory, presented by Walter Christaller (*8*), that we can divide space in a rational way by hexagons—that one hexagon can become the center of seven equal ones. Similar conclusions can be reached if we think of organization of population, movement, transportation, and so on. Such considerations lead to the conclusion that all human settlements—past, present, and future—can be classified into 15 units (*6*). Thus the basic units are defined as units No. 1 (man), No. 2 (room), No. 3 (home), No. 4 (group of homes), No. 8 (traditional town), and No. 15 (Universal City), and a systematic subdivision defines the others. All these units can also be classified in terms of communities (from I to XII), of kinetic fields (for pedestrians, from a to g; for motor vehicles, from A to H; and so on).

## The Quality of Human Settlements

We can now face the important question of quality in human settlements since we can refer to a specific unit by first defining its size. A small town, especially in older civilizations, can satisfy many of our esthetic needs

Fig. 12. Outward movement of the higher-income groups in the Detroit Standard Metropolitan Statistical Area. The curves show the per capita income of people residing at several distances from the central business district (C.B.D.).

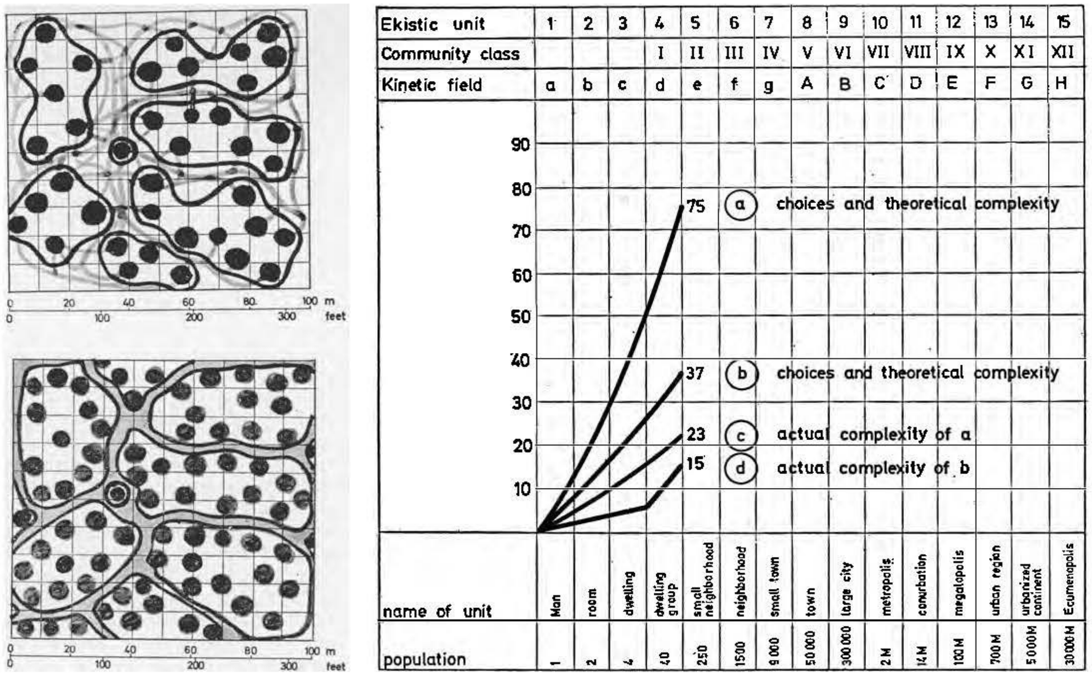



Fig. 13. (Top left) Toward organization of a dwelling group unit, showing first phase of organization: formation of dwelling groups, connections in certain areas, economy in use of space and time. (Bottom left) Toward organization of a dwelling group unit, showing third phase of organization: order in function and structure, maximum economy in use of space and time. (Right) Complexity and simplicity.

for picturesque streets and squares, and this is why we like it. But most people want to visit it, not to become its permanent inhabitants, as they are guided by the first of the five principles discussed above and try to maximize their potential contacts in the big cities, in order to have more choices for a job, for education and health facilities, and for social contacts and entertainment.

In our era, which begins with London at the time it was approaching a population of 1 million, about two centuries ago, and in other areas later, we lost the ability to satisfy all five principles. Guided by principles 1 and 2 we reached the stage of the big city, but in these cities we do not satisfy the other principles, especially principles 4 and 5, and we are not happy. We say that our settlements have no quality, and this is true in many respects, but we have to define what we mean. We need such a definition because we must remember that we now have much more water, of better quality, in our homes than man has had at any previous time, and we have much more energy available for conditioning our environment and for making contacts. A statement closer to the truth would be that our cities are better than the small cities of the past in many respects and worse in others.

Judgment about quality can be made in several ways in terms of the relation of every individual to his environment—that is, his relation to nature, society, shells, and networks—and the benefit that he gets from these contacts. We can measure his relations to air and to its quality; to water in his home, in the river or lake, and at sea (its quality and his access to it); and to land resources (their beauty and accessibility) and the recreational and functional facilities provided by them; and we can express judgments based on measurements of many physical and social aspects of the cities. Out of the great number of cases that I might cite I have selected three of the most complex ones.

We often talk about the greater contacts that the big city offers us, but we do not measure these contacts at every unit of the ekistic scale. If we do so we will discover that in units 2 and 3 (room and home) we have fewer person-to-person contacts than we had before, because of smaller families and new sources of information (radio and television); that in units 4, 5, and 6 (that is, in the dwelling group and neighborhoods) we have far fewer contacts because of the multistory building and the intrusion of automobiles in the human locomotion scale (*9*); and that in the larger units we have increased contacts because of the news transmitted to us by telecommunications media, the press, and so on (Fig. 10). In this way we see that we increase our one-way and, by telephone, two-way potential contacts with people and objects far away from our living area and decrease potential contacts with those close by. Is this reasonable for any of us, and especially for the children who cannot cross the street? This is a problem of quality of life seen in human terms. The answer to this problem is, I think, a city designed for human development (*10*).

As a second case I have selected one which refers, not to the relation of man to his environment, but to the relation between two persons as they are related to their environment. If we take the case of the Urban Detroit Area, which has been defined by a 5-year study (*11*) and covers 37 counties (25 in Michigan, 9 in Ohio, and 3 in Ontario), and rate the value of all its parts, taking as an example the esthetic value of its natural landscapes, and measure the number of units of esthetic value associated with places a person can visit within 1 hour, we find that the person who owns a car has access to 582 units from the centre of the city and to 622 from the outskirts. However, a person without a car has access to only 27 units—that is, less than 1/20 the number of units to which the other person has access, even if his income is half as great. If we now remember that, in the past, poor and rich had equal opportunities to visit places by walking, we will see that modern technology has increased the gap between people relative to the choices they have for making contacts in their settlements (Fig. 11). If the Urban Detroit Area grows in a way which takes people farther apart, and if the wealthier ones move outward at a speed of 1.8 meters (2 yards) a day (Fig. 12), we can understand how critical is the situation we have created through the use of modern technology without an understanding of the whole system of the city and how we serve it.

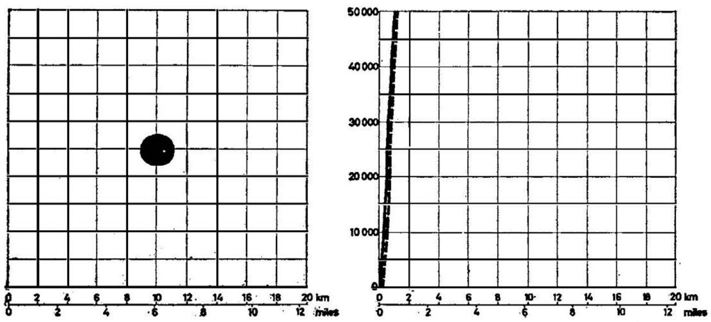



Fig. 14. (Left) A city of 50,000 people. (Right) Case of a citizen in a city of 50,000 people. (Solid line) Theoretical number of possible contacts: 50,000; (dashed line) actual number of possible contacts: 50,000.

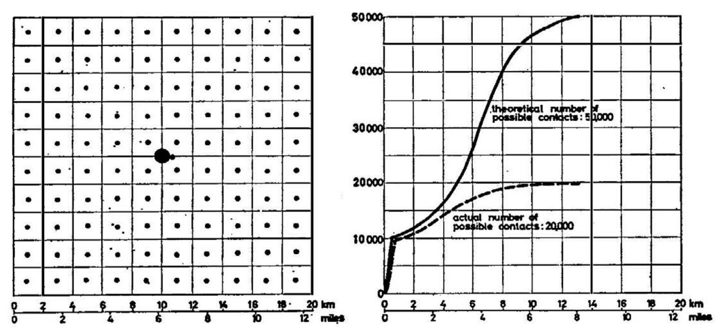



Fig. 15. (Left) A city of 10,000 people in a region of 50,000 people. (Right) Case of a citizen in a city of 10,000 people in a region of 50,000 people.

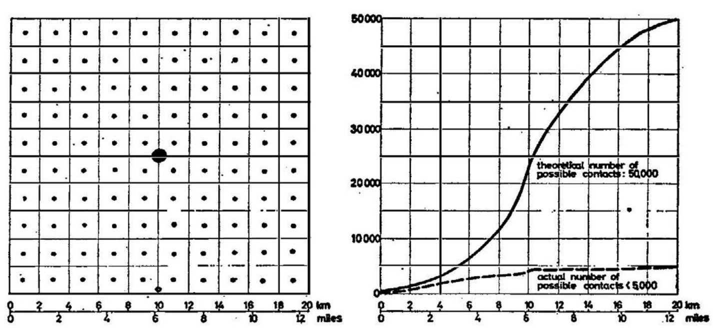



Fig. 16. (Left) A city of 10,000 people in a region of 50,000 people. (Right) Case of a "peasant" in an outlying village of a region of 50,000 people.

As a third case I have selected the problem of complexity, about which we talk a lot and do very little. The great size of the modern city is not what causes the bad quality of our environment. Corporations have increased in size even more without any loss in efficiency, and the armies of World War II were able to operate very efficiently despite their unprecedented size and rate of growth. The quality of our city, expressed, for example, in terms of a system of movement, is decreasing because we have not been able to reduce the increasing complexity by introducing a high degree of simplicity, as primitive man managed to do. The number of choices for primitive man in a space having no pattern of organization is the same as the number of persons in the space—let us say 37. Since there is no structure in the system, the complexity equals the number of choices—37. When a structure—social (family) or physical (wall of a compound)—is built into the system (Fig. 13, top left and right), the number of choices remains 37 but the actual complexity is 15 [6 (compounds) + 9 (maximum number of persons within one compound)], and this means a coefficient of simplicity of 2.5. If this happens, then people learn to come together in larger numbers and the same area may contain 75 people; that is, there are 75 choices (Fig. 13, bottom left) and a theoretical complexity of 75 but an actual complexity of 23 (9 + 14), or a coefficient of simplicity of 3.4.

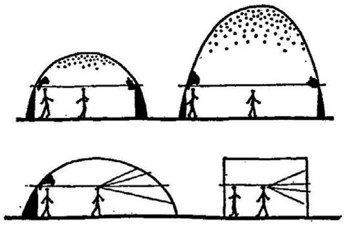
In a similar way we find that the actual choices given an individual belonging to a group of 50,000 people, or living in a city of 50,000 population, theoretically number 50,000 (Fig. 14). These choices are reduced to 20,000 if 10,000 of the people live in the city and 40,000 live in the surrounding country (Fig. 15), and they are reduced to 5000 for a farmer living far out in the countryside (Fig. 16), as only a certain fraction of a man's time can be devoted to making contacts. What about the quality of contacts in the small village?

**Morphogenesis**

The question now arises, if we know how to analyze and define quality, can we do anything to ameliorate conditions in cities whose quality is not high? The answer is that man has often faced many of these problems (not all) by giving his static settlements proper structure. By this I mean the settlements which were created up until the 17th century and which ranged in size from No. 2 units—that is, from rooms which, once created, did not grow—to No. 9 and 10 units—large cities, very often surrounded by walls, that seldom grew. Peking is probably the only No. 10 settlement created before the 17th century. This is the structure which led to the shape and forms of the cities we admire today. It is time we tried to see how the changes came about; it is time we examined the morphogenesis of human settlements.

Morphogenesis in human settlements varies with the type of unit we are dealing with. From the many types of units I will select the room, the No. 2 unit, and will follow its formation. We do not know how and when the formation of a room started. It probably started in many parts of the world, and probably the rooms had many forms and sizes. We have reason to believe that the first rooms were of moderate size (according to today's standards), but they may have been very small one-man, one-night huts similar, in a way, to those built and used by the apes (*12*). In any case the moment came when some primitive people had round huts and others had orthogonal ones, and when there were different types of roofs or, in some cases, no roofs at all. In at least one modern instance—that of the Bushmen of the Kalahari Desert in southwest Africa—there is no door to the hut; the Bushmen jump into it over the wall (*13*).

Of great interest for us is the fact that, no matter how the first room started or how it was developed, the room always ends up, given enough time for the development of a composite settlement, with a flat floor, a flat roof, and vertical orthogonal walls. We can see the reasons for this. Man probably first builds the horizontal floor, so that he can lie down and rest, and walk without great effort or pain (the second principle). He then tends to build vertical orthogonal walls. The reasons for making the walls vertical and orthogonal are many: when he is in the room he feels at ease with, and likes to see, surfaces that are vertical relative to his line of sight (Fig. 17); he makes the walls vertical in conformity with the law of gravity; and by making them vertical and orthogonal he accommodates his furniture best (Fig. 18) and saves space when he builds two rooms side by side (Fig. 19). For similar reasons he needs a flat roof: a horizontal surface above his head makes him feel at ease when he is inside the room, and this construction enables him to use larger pieces of natural building materials and to fit one room on top of another without any waste of space, materials, and energy. In this way the form of the room is an extension of man in space (in terms of his physical dimensions and senses) and follows biological and structural laws.



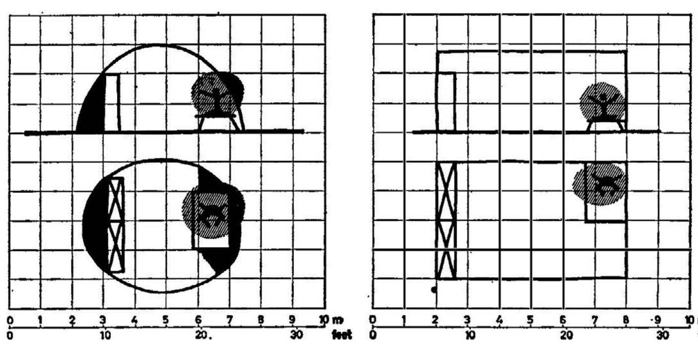



Fig. 17 (above). Formation of the walls. Walls have to fit the body and the senses of man. Fig. 18 (right). Formation of the walls. Curved walls (left) lead to waste in the synthesis of furniture and room; straight walls (right) allow the most economic synthesis of furniture and room.

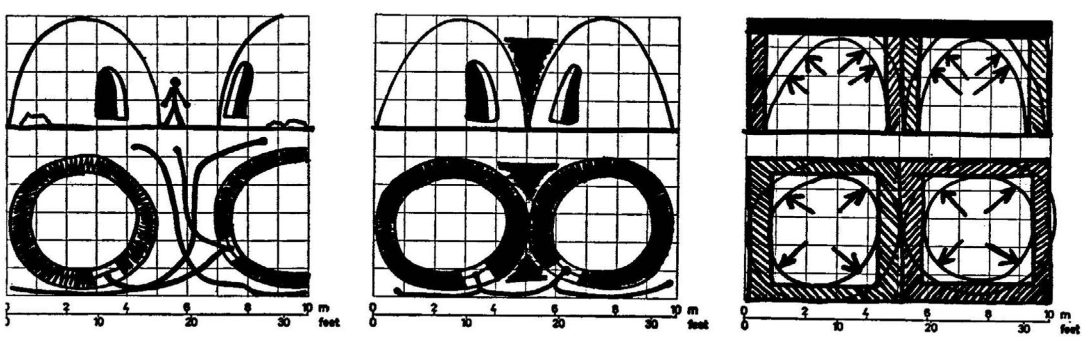



Fig. 19. Formation of the walls. Two separate nonconnected rooms (left) can remain independent units, but people tend to bring them together. Two separate, connected rooms (middle) cannot remain independent units; they create many problem surfaces. Two connected rooms (right) tend to eliminate the problem surfaces; they tend to occupy a minimum total area.

Thinking in these terms, we reach the conclusion that the morphogenesis of the room is due to several forces derived either from man or directly from nature. When we move on to the house, the neighborhood, the city, and the metropolis we discover that several forces enter into the game, but their relationships change from case to case (*14*). The unit of the metropolis, for example, is too large to be influenced directly by the unit man (again, in terms of his physical dimensions and senses) whereas it *is* influenced by the natural forces of gravity and geographic formation, by modes of transportation, and by organization and growth of the system.

Thinking in this way for all 15 ekistic units, we reach the following conclusion. The changing forces of synthesis which cause morphogenesis within every type of ekistic unit follow a certain pattern which, in terms of percentages, shows a decline of the forces derived from man's physical dimensions and personal energy and a growth of those derived directly from nature itself as a developing and operating system (Fig. 20).

Figure 20 can be understood, and will not be misinterpreted, if we keep in mind the following considerations.

First, it does not represent any specific case (a room in a desert house can be different from one in a mountain dwelling), but represents the average for all cases in each ekistic unit.

Second, the ratio between the different forces given for each ekistic unit in Fig. 20 is based only on personal experience which cannot be expressed by measurements at this stage. It is based on the assumption that all forces can be assigned equal importance. We have no way of proving that this is the case, but several trials prove simply that, by proceeding in this completely empirical way, we make the smallest number of mistakes. For this reason the shape of the surface representing the validity of each force (Fig. 20) can be considered to correspond to reality, while the ratio of one force to another is arbitrary.

What I can state here is that many years of experience as a builder of human settlements has proved for me the general validity of these diagrams in everyday practice for small-scale units and for several large-scale units, as shown in recent studies made in France (*15*) and in the Urban Detroit Area study (*11, 16*). I can also say that the same diagram of synthesis is reasonably valid beyond the limits of the ekistic

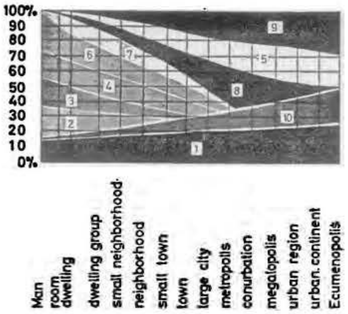



Fig. 20. Probable validity of the forces of ekistic synthesis: 1, gravity; 2, biological; 3, physiological; 4, social; 5, movement; 6, inner structure; 7, external structure; 8, growth; 9, organization; 10, geographical.

logarithmic scale, for units smaller or larger than the ekistic ones. Thus the ekistic logarithmic scale can be considered a basic tool for the study of synthesis in space, which is a basic characteristic of morphogenesis of human settlements. In nature, gravity, for example, plays an increasing role in larger units—this is why large birds do little flying—and a decreasing one in smaller units (Fig. 21). In this way we can understand the changing relationships between several types of forces which influence the formation of several types of organic and nonorganic systems in space.

## Two Myths

Another question now arises: If we can analyze the problem of quality and understand the morphogenetic process which should enable people to build properly and improve an undesirable situation, why are conditions so bad in our cities? The answer, apart from the fact that some problems are not related to the physical structure of the city, can run along the following lines.

1) Man, who understood the morphogenetic process for the small units, thought that the forces and laws valid for the small units were valid for the big ones that we build today, and this is not true.

2) New forces—like motor vehicles—have entered the game, and their impact on the city has not been understood.

3) Man did not seem able to learn about the new problems, and did not even seem interested in them, before the crisis came. He became confused, to the point of mistaking poverty for an urban problem, whereas it is simply a huge human problem which becomes more apparent in the urban areas because of the proximity of the rich, who have not been previously exposed to poverty, to the poor.

We can prove the foregoing three points in many ways, by considering some myths which still prevail in the minds of many people. I have selected two characteristic ones. I will start with the myth of the city of optimum size.

*The city of optimum size.* A long discussion is taking place throughout the world about the need to build new cities of optimum size, and proposals have been made by many experts and adopted in government policies, but no one can prove his case in a convincing way.

Some define optimum size as being related to the income of the people; but in a developing world, where the average per capita income increases by 2 percent a year (and by more in urban areas), what is the meaning of this optimum over a long period?

Others argue in terms of optimum numbers of people and of organizational and, more specifically, municipal efficiency, but they are not able to produce any convincing proof (*17*). Even if they could, comparisons of one city with another city have no meaning in a world where people no longer live in isolated cities but live in urban systems. But if I could prove that one city of 200,000 people had greater municipal efficiency than a city of 1 million, I must also prove that the people in the two cities were equally satisfied (otherwise what is the meaning of efficiency for them?) or that a system of five cities of 200,000 was as efficient as the city of 1 million, which is not the case.

Others base optimum size on organizational aspects such as one school or one hospital for so many children or people. But, in a world of changing ratios between age groups and of changing technical and managerial abilities, this line of thinking cannot lead anywhere. Such considerations are very useful for calculating needs which have to be satisfied in certain areas and periods, but not for calculating the optimum size of the city. Technological calculations based on the means of transportation cannot be helpful either. Since speeds change continuously, how can we speak of an optimum distance? We can have an optimum distance expressed in terms of time, but this means a continually changing physical dis-

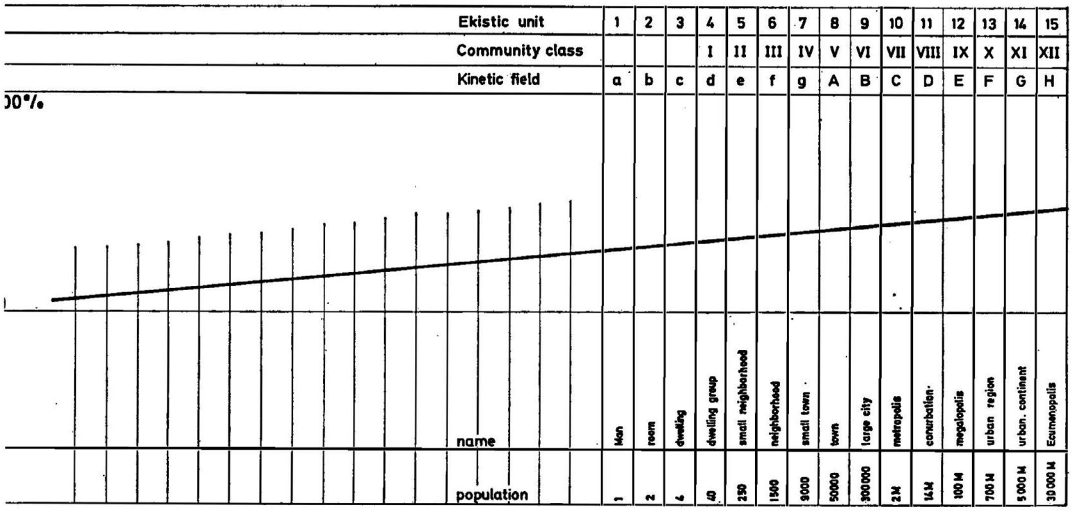



Fig. 21. Influence of the force of gravity in morphogenesis.

ınce. Are we going to stop the development of technology?

In this changing world there is no ptimum size for a city. The dynamic ties have no optimum size, but only ı optimum speed of growth. And hat this optimum speed of growth is, a very complex question, the answer › which depends on many factors con:rning the city itself and its relationıip to the total space around it. For cample, the answer for two dynamic ties, one 10 and one 30 kilometers 'om a metropolis, are completely dif:rent.

Is there no optimum size with which e can deal? The answer is that there , because there is one relatively conant element, and this is man, insofar ; his body and senses are concerned. I ıink that, for the foreseeable future, e can reckon with a man whose body ıd senses will not change. If this is ›, we are led to the conclusion that ıere is a unit of space which will conıue to serve his needs as it has done ı the past; this unit is the circle that ın be inscribed in a square 2 kiloıeters on a side (*4*). The importance : this unit is demonstrated by the :owth of actual traditional cities and y the diagram of synthesis in space 'ig. 20), which shows that direct huıan forces do not go beyond the cirımference of this circle. With tradiɔnal population, this unit contains ),000 people.

The conclusion is that the optimumze city is a myth. But any city can be divided into physical units of optimum size, and these may be used as a basis for planning that envisions an optimum number of people in a community. However, this latter goal is much more difficult to attain. I do not believe that we are ready for it, although we have the necessary arguments and data.

*The static plan.* Another myth which still prevails is that we can solve the problems of our cities through the conception, and official recognition, of a physical plan expressed by a two- or three-dimensional drawing. But our cities are growing organisms. They need a development policy leading to a development program which is expressed, in space, by physical development plans, but they also need economic, social, political, administrative, technological, and esthetic programs.

This does not mean that there are no areas where a physical plan can be final; if there were none, we would all be mentally ill. We need a room with constant dimensions, a home that gives us a feeling of permanency, a street and a square which do not change and which are esthetically satisfying. Such considerations lead to the question, to what extent can our environment be a constant one? The answer is that, if there is a unit of optimum size such as a room, a home, a community (up to the one of 1-kilometer radius), this can and should be constant. In this way we can face a world of changing dynamic cities by building them with constant physical units within which we can create quality—units meant for a certain purpose and containing a certain desirable mixture of residences, cultural facilities, industry, and commerce. These would be designed on the basis of the long human experience which led to the natural growth of cities, such as Athens and Florence, or to the building of planned cities such as Miletus and parts of Paris, which we admire today.

We can design these small units if we understand the processes of synthesis and morphogenesis of the past and if we do not try to discover new patterns of life expressing nonexistent principles, just for the sake of changing the traditional ones. On the other hand, for the larger units and for the dynamically changing ones with which man has had no experience or a very bitter one, we must proceed in a different way. Not knowing what is going to be good or bad, we must use a completely different approach. We must build all possible alternatives and compare them in terms of the quality of life they offer their citizens. This approach is impossible in practice (we cannot play with the happiness and the incomes of millions) and would have been impossible in the laboratory even 20 years ago. But now we can build simulation models and compare them by means of computers.

To do this we have developed the IDEA method (the acronym stands for Isolation of Dimensions and Elimination of Alternatives). We first build all alternatives for the future of an urban system (this is possible if, through experience, we concentrate on the most important dimensions for every type of unit and every phase) and then eliminate the weakest ones. It is only in this way that we can avoid errors based on the mistaken belief that "I know," and can avoid the long period required for learning by trial and error, as primitive man learned.

This method certainly does not eliminate mistakes, but it reduces them to a minimum. Its application to the very difficult problem of the Urban Detroit Area (*11, 16*) has demonstrated how useful it can be for large-scale areas for which there is no human experience at all.

Experience has convinced me that, if we can develop a science of human settlements and, through it, recognize the guiding principles, laws, and procedures of man's action regarding terrestrial space, we can build much better human settlements in the future. This will be, not through the repetition of past solutions, but through their synthesis within the new frame formed on the basis of the new forces that have entered the game. The physical features of future cities can be at least as impressive as those of the famous cities of history or of today. At the same time, the guiding principle of real freedom of choice for everyone, not for certain classes only, can be implemented for the benefit of every person, and thus man's cities of the future can be better and far more important for all their inhabitants than the famous cities of the past.

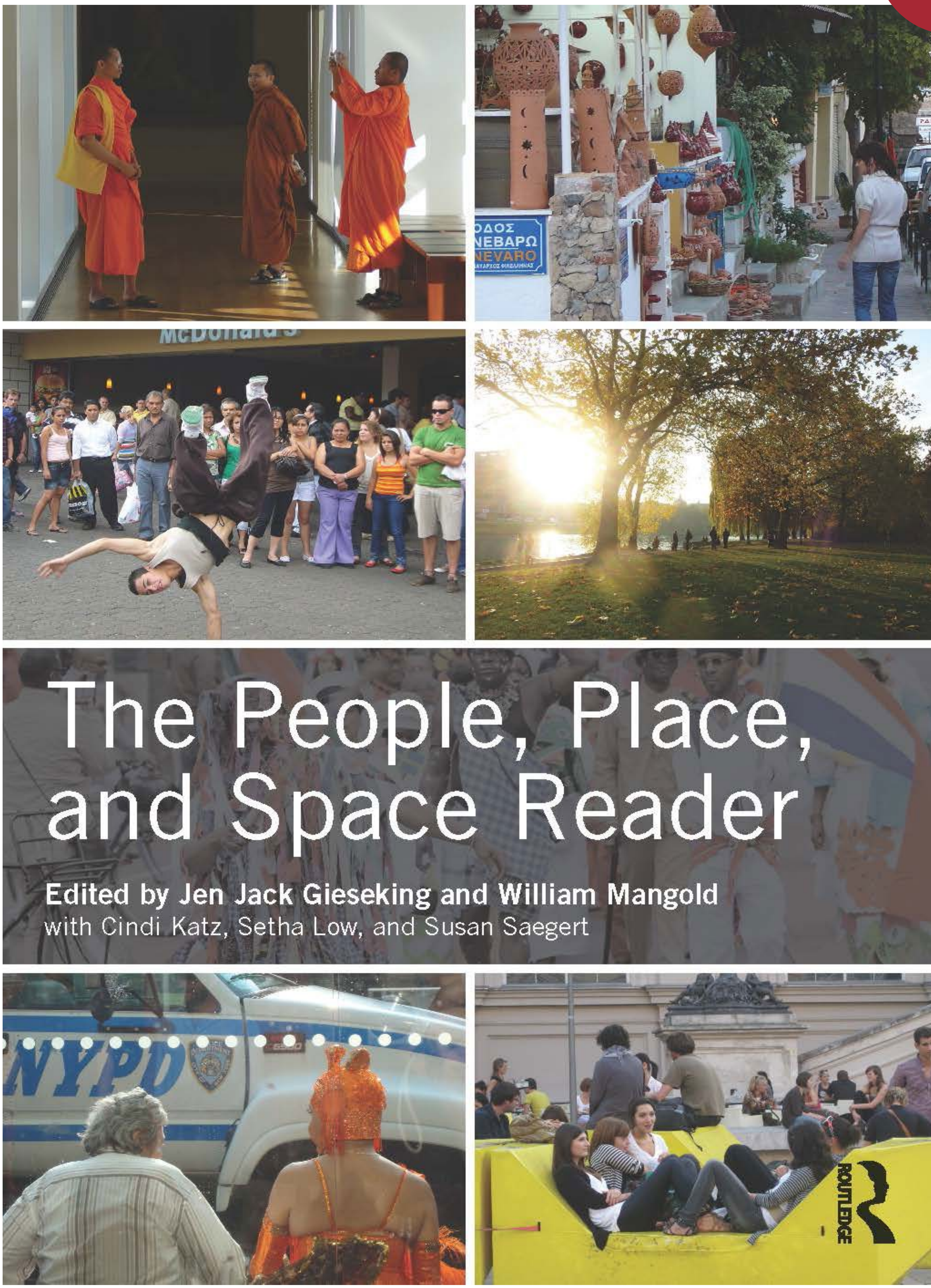
### References and Notes


1. E. T. Hall, *The Silent Language* (Doubleday, Garden City, N.Y., 1959); *The Hidden Dimension* (Doubleday, Garden City, N.Y., 1966).
2. *Time* **1969**, 49 (6 June 1969).
3. *Lancet* **1969-I**, 1273 (1969).
4. C. A. Doxiadis, *Science* **162**, 326 (1968).
5. ———, "The future of human settlements," speech delivered at the 14th Nobel Symposium, Stockholm, Sweden, September 1969 (Wiley, New York, in press).
6. ———, *Ekistics; An Introduction to the Science of Human Settlements* (Oxford Univ. Press, London, 1968), pp. 27–31.
7. ———, *Between Dystopia and Utopia* (Trinity College Press, Hartford, Conn., 1966).
8. W. Christaller, *Die Zentralen Orte in Süddeutschland* (Fischer, Jena, 1933).
9. C. A. Doxiadis, in *Health of Mankind*, G. Wolstenholme, Ed. (Churchill, London, 1967), pp. 178–193.
10. ———, *Ekistics* **1968**, 374–394 (June 1968).
11. ———, *Emergence and Growth of an Urban Region*, vol. 2, *Future Alternatives* (Detroit Edison Company, Detroit, 1967).
12. G. Clarke and S. Piggott, *Prehistoric Societies* (Hutchinson, London, 1965), p. 75.
13. L. van der Post, *The Lost World of the Kalahari* (Penguin Books, Baltimore, Md., 1962), p. 25.
14. C. A. Doxiadis, *Ekistics* **1968**, 395–415 (Oct. 1968).
15. *Etude d'Organisation Urbaine Future de l'Espace Français* [published by Société d'Etudes d'Urbanisme de Dévélopement et d'Aménagement du Territoire (EURDA) under the direction of C. A. Doxiadis (French affiliate of Doxiadis Associates), as DOX-FRA-A 5 for La Délégation à l'Aménagement du Territoire et à l'Action Régionale (Oct. 1969)].
16. C. A. Doxiadis, *Emergence and Growth of an Urban Region*; vol. 1, *Analysis* (1966); vol. 2, *Future Alternatives* (1967) vol. 3, *A Concept for Future Development* (1970) (Detroit Edison Co., Detroit).
17. W. A. Howard, *Ekistics* **1969**, 312 (Nov. 1969).

## READING

**Lynch, Kevin, "The City Image and its Elements," in Gieseking et al., eds, *The People, Place, and Space Reader* [New York: Routledge Press, 2014], pp. 50–55**

**UDHT**



# The People, Place, and Space Reader

Edited by
Jen Jack Gieseking and
William Mangold
with Cindi Katz,
Setha Low,
and Susan Saegert

Routledge
Taylor & Francis Group
NEW YORK AND LONDON

First published 2014
by Routledge
711 Third Avenue, New York, NY 10017

and by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

*Routledge is an imprint of the Taylor & Francis Group, an informa business*



*British Library Cataloguing in Publication Data*
A catalogue record for this book is available from the British Library

*Library of Congress Cataloging-in-Publication Data*
The people, place, and space reader / edited by Jen Jack Gieseking,
William Mangold; with Cindi Katz, Setha Low, and Susan Saegert.
pages cm
1. Social ecology. 2. Urban ecology (Sociology) 3. Human ecology.
4. Environmental psychology. 5. Public spaces. I. Gieseking, Jen Jack.
HM861.P46 2014
304.2--dc23
2013037743

ISBN13: 978-0-415-66496-7 (hbk)
ISBN13: 978-0-415-66497-4 (pbk)
ISBN13: 978-1-315-81685-2 (ebk)

Typeset in Goudy and Optima
by Saxon Graphics Ltd, Derby

# 8
# The City Image and Its Elements

(1960)

Kevin Lynch

There seems to be a public image of any given city which is the overlap of many individual images. Or perhaps there is a series of public images, each held by some significant number of citizens. Such group images are necessary if an individual is to operate successfully within his environment and to cooperate with his fellows. Each individual picture is unique, with some content that is rarely or never communicated, yet it approximates the public image, which, in different environments, is more or less compelling, more or less embracing.

The contents of the city images so far studied, which are referable to physical forms, can conveniently be classified into five types of elements: paths, edges, districts, nodes, and landmarks. Indeed, these elements may be of more general application, since they seem to reappear in many types of environmental images. These elements may be defined as follows:

1 *Paths*. Paths are the channels along which the observer customarily, occasionally, or potentially moves. They may be streets, walkways, transit lines, canals, railroads. For many people, these are the predominant elements in their image. People observe the city while moving through it, and along these paths the other environmental elements are arranged and related.

2 *Edges*. Edges are the linear elements not used or considered as paths by the observer. They are the boundaries between two phases, linear breaks in continuity: shores, railroad cuts, edges of development, walls. They arc lateral references rather than coordinate axes. Such edges may be 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. 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.

3 *Districts*. Districts are the medium to large sections of the city, conceived of as having 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 if visible from the outside. Most people structure their city to some extent in this way, with individual differences as to whether paths or districts are the dominant elements. It seems to depend not only upon the individual but also upon the given city.

4 *Nodes*. Nodes are points, the strategic spots 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 junctions, places of a break in transportation, a crossing or convergence of paths, moments of shift from one structure to another. Or the nodes may be simply concentrations, which gain their importance from being the condensation of some use or physical character, as a street-corner hangout or an enclosed square. Some of these concentration nodes are the focus and epitome of a district, over which their influence radiates and of which they stand as a symbol. They

may be called cores. Many nodes, of course, partake of the nature of both junctions and concentrations. The concept of node is related to the concept of path, since junctions are typically the convergence of paths, events on the journey. It is similarly related to the concept of district, since cores are typically the intensive foci of districts, their polarizing center. In any event, some nodal points are to be found in almost every image, and in certain cases they may be the dominant feature.

5 *Landmarks*. Landmarks are another type of point-reference, but in this case the observer does not enter within them, they are external. They are usually a rather simply defined physical object: building, sign, store, or mountain. Their use involves the singling out of one element from a host of possibilities. Some landmarks are distant ones, typically seen from many angles and distances, over the tops of smaller elements, and used as radial references. They may be within the city or at such a distance that for all practical purposes they symbolize a constant direction. Such are isolated towers, golden domes, great hills. Even a mobile point, like the sun, whose motion is sufficiently slow and regular, may be employed. Other landmarks are primarily local, being visible only in restricted localities and from certain approaches. These are the innumerable signs, store fronts, trees, doorknobs, and other urban detail, which fill in the image of most observers. They are frequently used clues of identity and even of structure, and seem to be increasingly relied upon as a journey becomes more and more familiar.

The image of a given physical reality may occasionally shift its type with different circumstances of viewing. Thus an expressway may be a path for the driver, an edge for the pedestrian. Or a central area may be a district when a city is organized on a medium scale, and a node when the entire metropolitan area is considered. But the categories seem to have stability for a given observer when he is operating at a given level.

None of the element types isolated above exist in isolation in the real case. Districts are structured with nodes, defined by edges, penetrated by paths, and sprinkled with landmarks. Elements regularly overlap and pierce one another. If this analysis begins with the differentiation of the data into categories, it must end with their reintegration into the whole image.

## PATHS

For most people interviewed, paths were the predominant city elements, although their importance varied according to the degree of familiarity with the city. People with least knowledge of Boston tended to think of the city in terms of topography, large regions, generalized characteristics, and broad directional relationships. Subjects who knew the city better had usually mastered part of the path structure, these people thought more in terms of specific paths and their interrelationships. A tendency also appeared for the people who knew the city best of all to rely more upon small landmarks and less upon either regions or paths.

The potential drama and identification in the highway system should not be underestimated. One Jersey City subject, who can find little worth describing in her surroundings, suddenly lit up when she described the Holland Tunnel. Another recounted her pleasure:

> You cross Baldwin Avenue, you see all of New York in front of you, you see the terrific drop of land (the Palisades) … and here's this open panorama of lower Jersey City in front of you and you're going down hill, and there you know: there's the tunnel, there's the Hudson River and everything. … I always look to the right to see if I can see the … Statue of Liberty. … Then I always look up to see the Empire State Building, see how the weather is. … I have a real feeling of happiness because I'm going someplace, and I love to go places.

## EDGES

Edges are the linear elements not considered as paths: they are usually, but not quite always, the boundaries between two kinds of areas. They act as lateral references. They are strong in Boston and Jersey City but weaker in Los Angeles. Those edges seem strongest which are not only visually prominent, but also continuous in form and impenetrable to cross movement. The Charles River in Boston is the best example and has all of these qualities.

The importance of the peninsular definition of Boston has already been mentioned. It must have been much more important in the 18th century, when the city was a true and very striking peninsula. Since then the shore lines have been erased or changed, but the picture persists. One change, at least, has strengthened the image: the Charles River edge, once a swampy backwater, is now well defined and developed. It was frequently described, and sometimes drawn in great detail. Everyone remembered the wide open space, the curving line, the bordering highways, the boats, the Esplanade, the Shell.

The Central Artery is inaccessible to pedestrians, at some points impassable, and is spatially prominent. But it is only occasionally exposed to view. It was a case of what might be called a fragmentary edge: in the abstract continuous, but only visualized at discrete points. The railroad lines were another example. The Artery, in particular, was like a snake lying over the city image. Held down at the ends and at one or two internal points, it elsewhere writhed and twisted from one position to the next. The lack of relation felt while driving the Artery was mirrored in its ambiguous location for the pedestrian.

Storrow Drive, on the other hand, while also felt to be "outside" by the driver, was clearly located on the map, because of its alignment to the Charles River. It was the Charles River, despite its role as the basic edge in the Boston image, which was curiously isolated from the detailed structure of the adjoining Back Bay. People were at a loss as to how to move from one to the other. We can speculate that this was not true before Storrow Drive cut off pedestrian access at the foot of each cross street.

Similarly, the interrelation of the Charles River and Beacon Hill was hard to grasp. Although the position of the hill is potentially explanatory of the puzzling bend in the river, and although the hill thereby gains a commanding enfilade view of the river edge, the Charles Street rotary seemed for most people to be the only firm connection between the two. If the hill rose sharply and immediately out of the water, instead of behind a masking foreshore covered by uses which are only doubtfully associated with Beacon Hill, and if it were more closely tied to the path system along the river, then the relation would have been much clearer.

In Jersey City, the waterfront was also a strong edge, but a rather forbidding one. It was a no-man's land, a region beyond the barbed wire. Edges, whether of railroads, topography, throughways, or district boundaries, are a very typical feature of this environment and tend to fragment it. Some of the most unpleasant edges, such as the bank of the Hackensack River with its burning dump areas, seemed to be mentally erased. The disruptive power of an edge must be reckoned with.

## DISTRICTS

Districts are the relatively large city areas which the observer can mentally go inside of, and which have some common character. They can be recognized internally, and occasionally can be used as external reference as a person goes by or toward them. Many persons interviewed took care to point out that Boston, while confusing in its path pattern even to the experienced inhabitant, has, in the number and vividness of its differentiated districts, a quality that quite makes up for it. As one person put it:

> Each part of Boston is different from the other. You can tell pretty much what area you're in.

Jersey City has its districts too, but they are primarily ethnic or class districts with little physical distinction. Los Angeles is markedly lacking in strong regions, except for the Civic Center area.

Subjects, when asked which city they felt to be a well-oriented one, mentioned several, but New York (meaning Manhattan) was unanimously cited. And this city was cited not so much for its grid, which Los Angeles has as well, but because it has a number of well-defined characteristic districts, set in an ordered frame of rivers and streets. Two Los Angeles subjects even referred to Manhattan as being "small" in comparison to their central area! Concepts of size may depend in part on how well a structure can be grasped.

## NODES

Nodes are the strategic foci into which the observer can enter, typically either junctions of paths, or concentrations of some characteristic. But although conceptually they are small points in the city image, they may in reality be large squares, or somewhat extended linear shapes, or even entire central districts when the city is being considered at a large enough level. Indeed, when conceiving the environment at a national or international level, then the whole city itself may become a node.

The junction, or place of a break in transportation, has compelling importance for the city observer. Because decisions must be made at junctions, people heighten their attention at such places and perceive nearby elements with more than normal clarity. This tendency was confirmed so repeatedly that elements located at junctions may automatically be assumed to derive special prominence from their location. The perceptual importance of such locations shows in another way as well. When subjects were asked where on a habitual trip they first felt a sense of arrival in downtown Boston, a large number of people singled out break-points of transportation as the key places. In a number of cases, the point was at the transition from a highway (Storrow Drive or the Central Artery) to a city street; in another case, the point was at the first railroad stop in Boston (Back Bay Station) even though the subject did not get off there. Inhabitants of Jersey City felt they had left their city when they had passed through the Tonnelle Avenue Circle. The transition from one transportation channel to another seems to mark the transition between major structural units.

## LANDMARKS

Landmarks, the point references considered to be external to the observer, are simple physical elements which may vary widely in scale. There seemed to be a tendency for those more familiar with a city to rely increasingly on systems of landmarks for their guides—to enjoy uniqueness and specialization, in place of the continuities used earlier.

Since the use of landmarks involves the singling out of one element from a host of possibilities, the key physical characteristic of this class is singularity, some aspect that is unique or memorable in the context. Landmarks become more easily identifiable, more likely to be chosen as significant, if they have a clear form; if they contrast with their background; and if there is some prominence of spatial location. Figure–background contrast seems to be the principal factor. The background against which an element stands out need not be limited to immediate surroundings: the grasshopper weathervane of Faneuil Hall, the gold dome of the State House, or the peak of the Los Angeles City Hall are landmarks that are unique against the background of the entire city.

Spatial prominence can establish elements as landmarks in either of two ways: by making the element visible from many locations (the John Hancock Building in Boston, the Richfield Oil Building in Los Angeles), or by setting up a local contrast with nearby elements, i.e., a variation in setback and height. In Los Angeles, on 7th Street at the corner of Flower Street, is an old, two-storey gray wooden building, set back some ten feet from the building line, containing a few minor shops. This took the attention and fancy of a surprising number of people. One even anthropomorphized it as the "little gray lady." The spatial setback and the intimate scale is a very noticeable and delightful event, in contrast to the great masses that occupy the rest of the frontage.

## ELEMENT INTERRELATIONS

These elements are simply the raw material of the environmental image at the city scale. They must be patterned together to provide a satisfying form. The preceding discussions have gone as far as groups of similar elements (nets of paths, clusters of landmarks, mosaics of regions). The next logical step is to consider the interaction of pairs of unlike elements.

Such pairs may reinforce one another, resonate so that they enhance each other's power; or they may conflict and destroy themselves. A great landmark may dwarf and throw out of scale a small region at its base. Properly located, another landmark may fix and strengthen a core; placed off center, it may only mislead, as does the John Hancock Building in relation to Boston's Copley Square. A large street, with its ambiguous character of both edge and path, may penetrate and thus expose a region to view, while at the same time disrupting it. A landmark feature may be so alien to the character of a district as to dissolve the regional continuity, or it may, on the other hand, stand in just the contrast that intensifies that continuity.

Districts in particular, which tend to be of larger size than the other elements, contain within themselves, and are thus related to, various paths, nodes, and landmarks. These other elements not only structure the region internally, they also intensify the identity of the whole by enriching and deepening its character. Beacon Hill in Boston is one example of this effect. In fact, the components of 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. 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 so as to form an identifiable space, and so on.

Paths, which are dominant in many individual images, and which may be a principal resource in organization at the metropolitan scale, have intimate interrelations with other element types. Junction nodes occur automatically at major intersections and termini, and by their form should reinforce those critical moments in a journey. These nodes, in turn, are not only strengthened by the presence of landmarks (as is Copley Square) but provide a setting which almost guarantees attention for any such mark. The paths, again, are given identity and tempo not only by their own form, or by their nodal junctions, but by the regions they pass through, the edges they move along, and the landmarks distributed along their length.

All these elements operate together, in a context. It would be interesting to study the characteristics of various pairings: landmark–region, node–path, etc. Eventually, one should try to go beyond such pairings to consider total patterns.

Most observers seem to group their elements into intermediate organizations, which might be called complexes. The observer senses the complex as a whole whose parts are interdependent and are relatively fixed in relation to each other. Thus many Bostonians would be able to fit most of the major elements of the Back Bay, the Common, Beacon Hill, and the central shopping, into a single complex. [...] Outside of this complex there are gaps of identity; the observer must run blind to the next whole, even if only momentarily. Although they are close together in physical reality, most people seem to feel only a vague link between Boston's office and financial district and the central shopping district on Washington Street. This peculiar remoteness was also exemplified in the puzzling gap between Scollay Square and Dock Square which are only a block apart. The psychological distance between two localities may be much greater, or more difficult to surmount, than mere physical separation seems to warrant.

Our preoccupation here with parts rather than wholes is a necessary feature of an investigation in a primitive stage. After successful differentiation and understanding of parts, a study can move on to consideration of a total system. There were indications that the image may be a continuous field, the disturbance of one element in some way affecting all others. Even the recognition of an object is as much dependent on context as on the form of the object itself. One major distortion, such as a twisting of the shape of the Common, seemed to be reflected throughout the image of Boston. The disturbance of large-scale construction affected more than its immediate environs. But such field effects have hardly been studied here.

## THE SHIFTING IMAGE

Rather than a single comprehensive image for the entire environment, there seemed to be sets of images, which more or less overlapped and interrelated. They were typically arranged in a series of levels, roughly by the scale of area involved, so that the observer moved as necessary from an image at street level to levels of a neighborhood, a city, or a metropolitan region.

This arrangement by levels is a necessity in a large and complex environment. Yet it imposes an extra burden of organization on the observer, especially if there is little relation between levels. If a tall building is unmistakable in the city-wide panorama yet unrecognizable from its base, then a chance has been lost to pin together the images at two different levels of organization. The State House on Beacon Hill, on the other hand, seems to pierce through several image levels. It holds a strategic place in the organization of the center.

Images may differ not only by the scale of area involved, but by viewpoint, time of day, or season. The image of Faneuil Hall as seen from the markers should be related to its image from a car on the Artery. Washington-Street-by-night should have some continuity, some element of invariance, with Washington-Street-by-day. In order to accomplish this continuity in the face of sensuous confusion, many observers drained their images of visual content, using abstractions such as "restaurant" or "second street." These will operate both day and night, driving or walking, rain or shine, albeit with some effort and loss.

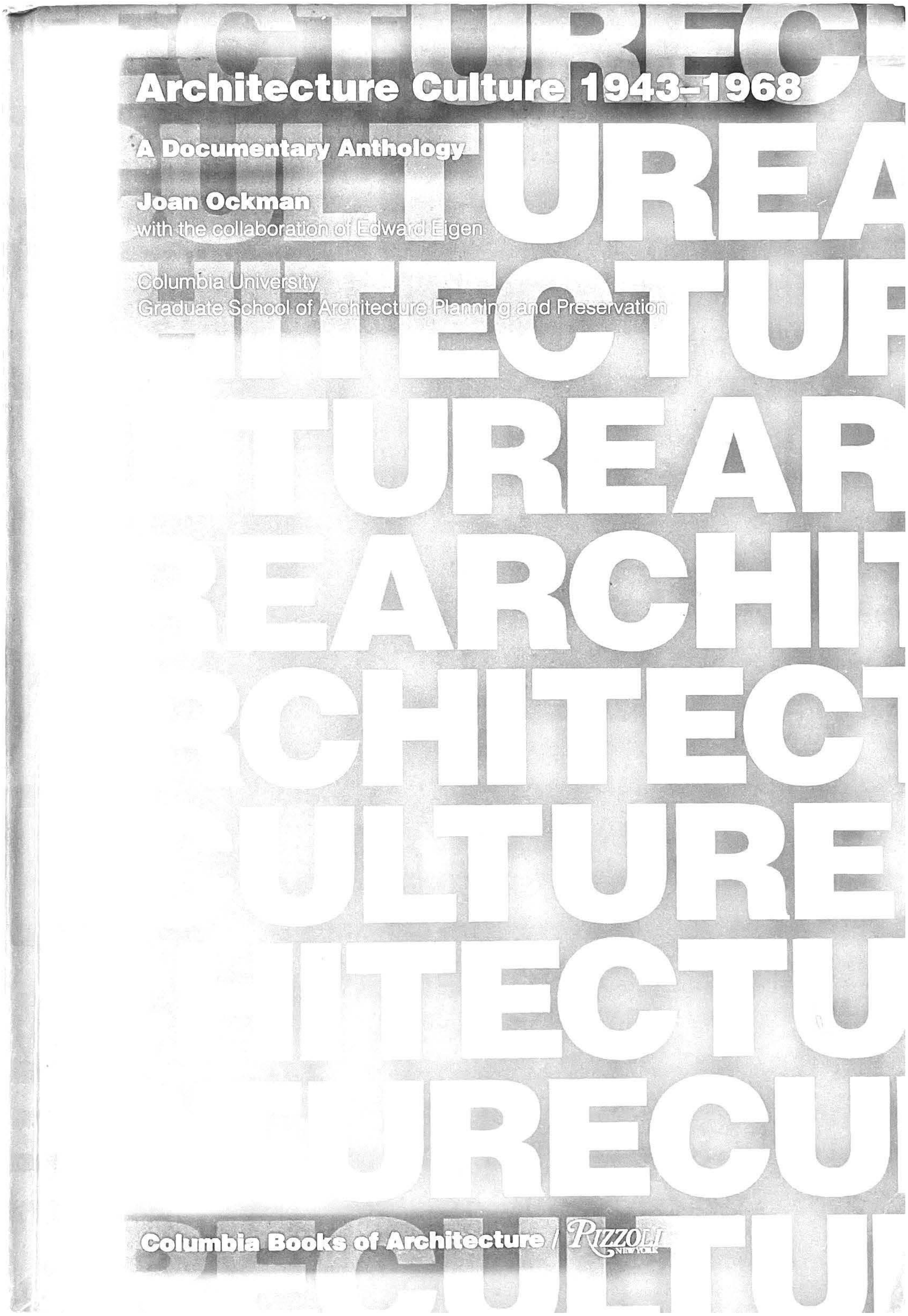
The image itself was not a precise, miniaturized model of reality, reduced in scale and consistently abstracted. As a purposive simplification, it was made by reducing, eliminating, or even adding elements to reality, by fusion and distortion, by relating and structuring the parts. It was sufficient, perhaps better, for its purpose if rearranged, distorted, "illogical." It resembled that famous cartoon of the New Yorker's view of the United States.

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

We are continuously engaged in the attempt to organize our surroundings, to structure and identify them. Various environments are more or less amenable to such treatment. When reshaping cities it should be possible to give them a form which facilitates these organizing efforts rather than frustrates them.

**Paul Virilio, "The Oblique Function" in Ockman, ed., *Architecture Culture, 1943-1968: A Documentary Anthology* (NY: Rizzoli, 1993), p. 408**





# Architecture Culture 1943–1968

## A Documentary Anthology

**Joan Ockman**
with the collaboration of Edward Eigen

Columbia University
Graduate School of Architecture, Planning and Preservation

*Architecture Culture 1943–1968: A Documentary Anthology* is a **Columbia Book of Architecture**. It was produced at Columbia University Graduate School of Architecture, Planning and Preservation through the office of the Dean, Bernard Tschumi, and the Director of Publications, Joan Ockman.

First published in the United States of America in 1993 by
Rizzoli International Publications, Inc.
300 Park Avenue South, New York, NY 10010



This book was supported by a grant from the Graham Foundation for Advanced Studies in the Fine Arts.

Book design by Jennifer Tobias
Printed and bound in Singapore

**Library of Congress Cataloging-in-Publication Data**
Architecture Culture: 1943–1968, A Documentary Anthology / edited by Joan Ockman with the collaboration of Edward Eigen.
p. cm.
"A publication of Columbia University Graduate School of Architecture, Planning and Preservation."
Includes bibliographical references and index.
ISBN 0-8478-1511-0 (hc)
ISBN 0-8478-1522-6 (pbk)
1. Architecture, Modern—20th century. 2. Architectural design.
I. Ockman, Joan. II. Eigen, Edward. III. Columbia University. Graduate School of Architecture, Planning and Preservation.
NA680.A57 1993
724'.6—dc20 91-38729
CIP

## Contents

# 1966

Claude Parent, an architect closely associated with sculptors and artists in France during the 1950s and 1960s, and **Paul Virilio**, a young painter and self-described "architect-urbanist," began their collaboration in 1963 with a design for a bunker-shaped *béton brut* church at Nevers. Two different tendencies converged in their work at this date.

One was the idea of architecture as sculpture. This brought Le Corbusier's
*64–67* postwar call for an urban-monumental synthesis of the major arts together with some recent manifestations of a more individualistic or expressionist nature—among them, Frederick Kiesler's Endless House, Frank Lloyd Wright's scheme
*308–13* for the Guggenheim Museum, Oscar Niemeyer's buildings in Brazil, and Mathias Goeritz's work with Luis Barragan in Mexico, not to mention Le Corbusier's own designs for Ronchamp and the Philips pavilion at the 1958 Brussels World's Fair. Seen as a poetic approach to form and a critique of the functionalist planning
*314–18* typifying the *grands ensembles* being built by the French government, the tendency acquired a strongly utopistic strain in the work of a number of French architects working outside the professional mainstream in the early 1960s. A major influence on Parent during these years was André Bloc, originator of Groupe Espace (an organization founded in 1951 on the premise of an integration of the arts), author of the book *De la sculpture à l'architecture* (1964), and editor of *L'Architecture d'Aujourd'hui*. Parent also collaborated with the artists Nicolas Schöffer, with whom he elaborated a theory of the "spatial-dynamic" city in the 1950s, Yves Klein, and Jean Tinguely. Virilio, for his part, fascinated by military planning and the spatio-temporal implications of geopolitical organization, began in 1958 to study abandoned World War II bunkers along the Atlantic coast. Observing children playing inside the massive, cryptlike forms that were stranded on the beaches at inclined angles because of the erosion of the dunes, he noted how their tilted geometry produced a vertiginous sense of disequilibrium. This gave him an intuition of the power of sculptural space not predicated on the right angle.

The second tendency affecting Parent and Virilio's work, which emerged from the then widespread discourse on mobility, open form, and flexibility
*181–83* initiated by Team 10 as a critique of CIAM urbanism. It centered around the multilevel urban megastructure, an idea that reached its peak around 1960 in
*325–34, 319–24* Japan in the projects of Kenzo Tange and the Metabolists, and in France with
*273–75* schemes by Yona Friedman, Paul Maymont, and others for "spatial cities." A project by Parent of this date, *Villes cônes éclatées* (1960), was no less total an urban vision, but it challenged the technoscientific bent of the other proposals by predicating movement not on transformable equipment but on perceptual shifts in the inhabitant's position and orientation along the sloping sides of its monumental conic forms.

After their collaboration at Nevers, Virilio's and Parent's respective research on perceptual psychology and the experience of unstable spaces led them jointly to elaborate a "theory of of the oblique." In 1966, as its "permanent manifesto," they launched a journal called *Architecture Principe*, from which the following statement by Virilio is taken. The publication ran for nine issues in 1966. The title was intended to convey the idea that architecture involved a disciplined application of theoretical principles rather than gratuitous acts of creative expression. The concept of oblique architecture derived from a critique of the way horizontal and vertical organization separated architecture from urbanism, canalizing movement around built obstacles. Utilization of the oblique plane, they argued, could permit "habitable circulation," with movement and housing sectionally integrated in a unitary artificial landscape. The result, radicalizing the classic Corbusian elements of ramps, architectural promenade, and roof terrace into a vast sculptural ensemble, was explicitly monumental.

As such, their work elicited criticism at a conference on experimental architecture held in 1966 in Folkestone, England, to which they were invited
365–69 along with Archigram and other radical groups. This caused them to be satirized
456–58 as "Prix de Romists of cosmic thought" by left-wing students at the Ecole des Beaux-Arts. Parent and Virilio defended themselves, claiming that the "total communication" afforded by their collective urban form and the psychophysical "potentialism" of occupying an inclined plane overcame the fixed architectural and social relationships inherent in traditional static structures.

Temperamentally and politically different, Parent and Virilio's collaboration soon parted company. In 1968 a conflict resulted from Parent's "aristocratic" attitude toward the student uprisings. Virilio took an active role, affixing a famous poster to the door of the Sorbonne chapel carrying a slogan borrowed from *Architecture Principe* 8: "Imagination seizes power." In 1970 the collaboration ended when Virilio chose not to participate with Parent in an exposition on the oblique at the Venice Biennale, citing his desire to avoid "official manifestations." However, he continued to advance the thesis. Appointed director of the Ecole Spéciale d'Architecture in the academic reforms following 1968, he lectured on the oblique for a number of years and in 1975 staged an exhibition on "bunker archaeology" (the subject of *Architecture Principe* 7) at the Museum of Decorative Arts in Paris. Parent, though largely giving up theoretical activity for built practice after the 1960s, published a book in 1970 entitled *Vivre à l'oblique* and another in 1981, *Entrelacs de l'oblique.*

"Architecture is a form of consciousness," Virilio and Parent wrote in September 1968 in *L'Architecture d'Aujourd'hui*, explaining their concept. "The submission to the idea of stability and vertical equilibrium is still an absolute in architecture, while in fields like philosophy or economic theory this vocabulary has long been left behind in favor of ideas of transference, displacement, and thus successive instability . . . stability is nothing more than the image of man mentally subjected to the magnetism of the earth. From now on this representation is anachronistic. It can only hinder our imagination." This rhetoric would have an echo in the 1980s in another radical movement. Amalgamating ideas from the literary-philosophical thought of Deconstruction and the dynamic imagery of Russian constructivism, "Deconstructivist" architects would posit forms intended to subvert architecture's conventional relation to the ground plane. Virilio himself, whom Parent once described affectionately as a "new Cassandra," would go on to become an important theorist of postmodern culture and urbanism. For more on Parent and Virilio's work in the 1960s, see Michel Ragon's *Claude Parent: Monographie critique d'un architecte* (1982) and the chapter entitled "Entre architecture-sculpture et pluridisciplinarité" in Jacques Lucan's *France: Architecture 1965–1988* (1989).

*From* Architecture Principe *1 (February 1966), unpaged [1–2]. Courtesy of the author .*

## The Oblique Function
### *Paul Virilio*

If physical nature is characterized by periodicity, the historical world is defined by polarity.

Moreover different types of human groupings have been of major importance in the successive modes of urbanization and thus in the origin of architectural forms.

This process of polarization (whose development need not be complicated here by more specific analysis) has, up to this point, accommodated the addition of individual dwellings in the town, then the addition of dwelling units in the apartment block, this then multiplied in all the apartment blocks of the city—each of these successive entities undergoing a change in volume, followed by universalization.

But these different modifications have above all resulted from an element that for a long time has wrongly been considered the effect of the others: orientation in space.

If the village was characterized by horizontality—a conquest of the soil broken only by the vertical aspiration of the church or chateau—the city has been but a succession of verticalities aimed at social conquest, New York being a culmination of this spatial direction.

If all the attempts to arrive at a new type of urban entity have failed, the garden city of the nineteenth century as well as the satellite city, it is because those who have been responsible for them have disregarded the predominance of an original axis of elevation as motive force for the other components of the whole.

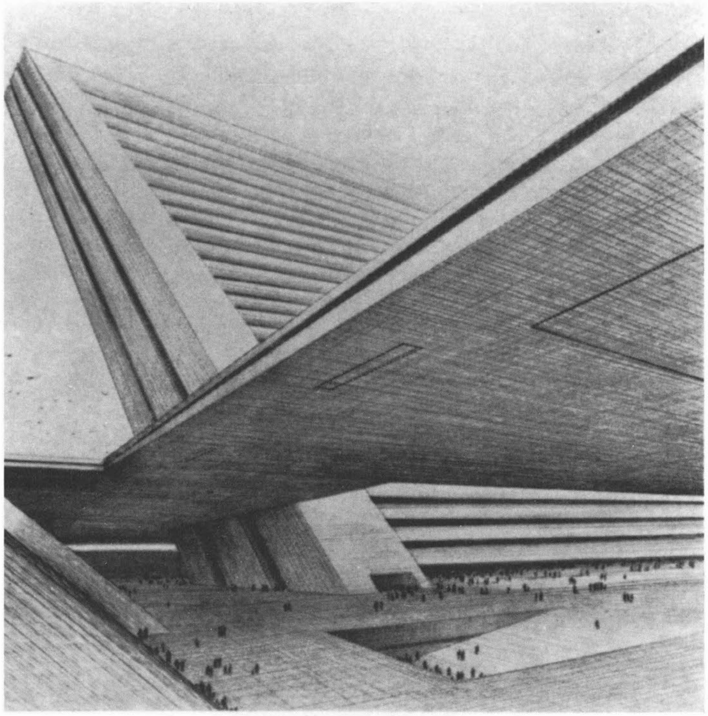
They have been fascinated by the additive aspect of human groupings, which is conditioned by the barbarism of industrial civilization in the process of coming into being.

Thus an urbanism of subjugation has succeeded an urbanism of reaction.

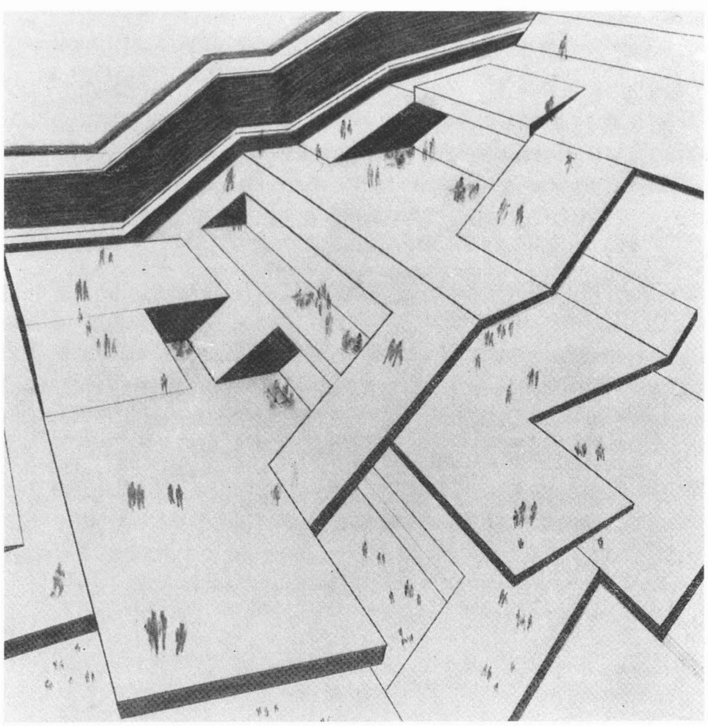
Important as are elements of number and type, it is now proven that they are powerless to realize a new mode of urbanization by themselves.

And we are now confronted by the overriding necessity to accept as a historical fact the end of the vertical as axis of elevation, the end of the horizontal as permanent plan, in order to defer to the oblique axis and the inclined plan, which realize all the necessary conditions for the creation of a new urban order and permit as well a total reinvention of the architectural vocabulary.

This tipping of the plane must be understood for what it is: the third spatial possibility of architecture.



Above: Interior detail. Below: Habitat on inclined plane.



COLUMBIA

GSAPP

URBAN DESIGN